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### THE AVA CONVENTION

Annually those interested in industrial arts and vocational education convene to discuss their problems.

Various and numerous are the subjects which they consider.

All interested should attend the coming AVA Convention at the Pantlind Hotel, Grand Rapids, Mich., Dec. 6–9, 1939.

### IN THIS ISSUE

The articles presented in this number of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION may be divided as follows:

For general reading: "Planning and Equipping an Industrial-Arts Department," "Industrial Arts in AVA Programs," "A Follow-up Study," "The Hope of a Nation," "Education for the Machine Age," "Magazines in the School Shop," "Lessons for Young Workers — XIII," "A Thought for Parents," and "Establishing a Shop Filing System."

For the woodworker: "Telephone Stand and Chair," "Convenient Key Case," "A Christmas Activity," "Rustic Furniture," "Handy Visible Auger-Bit Rack," "The Foot-Power Loom," "Garden-Hose Rack," "Spanish Chair," and "Mortise-and-Tenon Joint."

For the printer: "Aluminum Etchings and Dry Points" and "Brilliant Colored Christmas Cards."

For the metalworker: "Novel Tool-Bit Holder" and "Solder Dispenser."

For the electrician: "Toy Motor."

For the general shop: "The Foot-Power Loom" and "Wall Lamp in Plastics."

### NOVEMBER CONVENTIONS

| | |
|---|---|
| Nov. 2 | Iowa Vocational Association, Des Moines, Iowa. |
| Nov. 2 | Wisconsin Industrial Arts Association, Milwaukee, Wis. |
| Nov. 3–4 | Kansas Vocational Teachers Association, Wichita, Kans. |
| Nov. 15–18 | Missouri Vocational Association, St. Louis, Mo. |

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# T-12 SPEED LATHE

In appearance the T-12 Lathe is modern to the minute . . . a practical kind of modernism, however, that gives full regard to function as well as form. Smooth . . . attractive . . . and easy to operate, this lathe is certain to stimulate the student to produce a better grade of work. The absence of sharp corners and crevices makes the machine exceedingly easy to keep clean—headstock, bed and legs are shaped to shed chips and shavings to the floor. An improved machine in every respect from the "buttress" type legs to the plastic knobs on the control levers. Available with carriage and compound swivel rest in combination with a set-over tailstock. Get complete information, write today to the

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It takes practical equipment to teach a practical subject such as wood shop. And mark this, the T-12 Lathe is a practical machine in every sense of the word! One of the chief reasons for this is that the engineering behind this lathe is fundamentally sound. Carefully, step by step, the T-12 has been improved and re-designed to a point where it now represents the last word in operating efficiency.

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Douglas Fir is found growing over a wider area than any other tree. The natural range is from the Rocky Mountains to the Pacific coast, and from central British Columbia to northern Mexico. Prefers deep, moist, porous soils and plenty of light.

In the Pacific northwest where conditions are most favorable for its growth it reaches a height of 100-250 feet and a diameter of 3-10 feet. In other ranges it is usually smaller. In the forest it develops a tall, smooth trunk, topped by a narrow pyramidal crown.

The bark on mature trees is deeply furrowed and quite thick. The leaves or needles are linear, about an inch long, bluish green, and arranged closely in spirals around the stem. Remain on twigs for many years. The fruit or cone is brownish-red and 2 to 4 inches long. Easily identified from all other trees by protruding bracts or "straws".

INDUSTRIAL ARTS and VOCATIONAL EDUCATION
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# Planning and Equipping An Industrial-Arts Department

## Homer C. Rose

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*John Dewey Junior High School*

## Roy R. Van Duzee

*Supervisor Industrial Arts,*
*West Allis, Wisconsin*

*An authoritative article on the planning for and equipping of a small junior high school.*

The responsibility which rests on a group assigned the task of planning for an industrial-arts department of a school is an important and challenging one, and the task demands considerable thought and insight. The building space required calls for the outlay of a large sum of money and the equipment is expensive. Errors in room planning and equipment purchases are therefore costly, not alone in money, but wrong planning and wrong equipment selections may obviate the very purposes being sought through industrial-arts experiences. The problem should therefore be approached with a thorough understanding of the general educational philosophy and of the objectives of industrial arts as a guide.

The writers were confronted with such a task two years ago. They were asked to prepare cost data which could be used by the superintendent of schools in asking for a bond issue for completing and equipping a wing of the John Dewey Junior High School in West Allis, Wis. It is proposed to relate herein some of the problems involved in arriving at the funds needed, and how the planning went forward with the superintendent, the school principal, the school architect, and the board of education.

Fortunately the junior-high-school curriculum had just recently been thoroughly studied. The idea emphasized in the curriculum was that it should provide experiences that all boys and girls should have in grades 7 to 9. It took into account the physical and psychological characteristics of children at the junior-high-school age, and the selection of experiences which would further their development, and help them adjust themselves to their environment, so that they might become worthwhile citizens in the community in which they live. What did this mean in terms of shops for this school which was to immediately house 500 students and ultimately accommodate 700 students?

### Activities to Be Provided for in the Shop

The junior-high-school program, which follows, was planned to contribute to living intelligently, adjust the pupil to his environment, and assist him to become a worthy self-supporting citizen.

### Courses to Be Offered

| *Grade* | *1st Semester* | *2nd Semester* |
|---|---|---|
| 7th grade | Duplicating | General Drawing |
| 8th grade | General Wood | General Electricity |
| 9th grade | General Metal | General Metal |

Time allotment, one 45-minute period and two 90-minute periods per week for twenty weeks each semester.

This selection of activities makes it possible to work with a wide range of materials and with both hand and machine tools. It provides for planning, studying, and selecting materials, planning work procedures, studying and using constructions, forming and shaping materials, treating and assembling materials, and finishing them into worth-while articles of acceptable standards of workmanship. It permits the pupil to study the scientific, and mechanical principles underlying widely used machines and appliances. The student may develop ability to care for, and use common mechanical devices and construct, repair, and maintain the equipment about the home or wherever he may be and to develop abilities useful as leisure-time activities. Shop layouts, equipment lists, and other materials were planned so as to facilitate teaching methods that would develop desirable personality traits such as initiative, resourcefulness, cooperation, and proper attitudes toward safety.

It may be of interest at this point to state why ceramics, leathercraft, model-boat building, photography, aeronautics, and many other activities were not included in the course of study. The writers felt and still feel that one semester is little enough time for a pupil to adequately sample and be changed by an activity. Ceramics and leatherwork, as well as other craft and hobby interests are well served in art courses and in the activity club periods in the school.

We cannot explore all of the vocations followed by man — there are reported to be over 20,000 of them. Our approach to helping boys choose a lifework is by incorporating into a few well-organized and well-selected courses those basic skills, knowledges, and attitudes necessary for success in all technical fields. Many of these skills and attitudes are likely to be neglected, we believe, in the comprehensive general shop courses or so-called laboratory courses. This is particularly true where the class enrollment is large. Verne C. Fryklund, Supervisor of Industrial Education, Wayne University, has written ". . . Creative learning in industrial arts means guided opportunities for bringing the best out of learners in terms of skills, attitudes, ideals, and appreciation in industrial activities. The organized program for creative learning permits of better integration in progressive learning than does the incidental type. Both forms require equipment, but the one on the incidental basis may lead to abuse of the equipment, development of bad habits, wrong impressions of industrial practices and hit-and-miss learning. It is costly at its best. The other, the one on the organized basis, is the more likely to lead to fuller measure of creative learning. . . ."[1]

The work is divided into six semesters each of which we think of as a comprehensive unit course. An example is the course called general wood where a boy learns first those skills necessary to craftsmanlike work in wood, and the closely related and contributing facts about the industry, its problems, processes, and products. This is in itself too large an order to fill in one semester.

We think of our work as part of general education. Many of the objectives of con-

[1]Fryklund, Verne C., "Organization and Learning in Industrial Arts Education," I.A.V.E., March, 1938, p. 113.

sumer knowledge, avocational interests, and the like, are the natural by-products of the skillful and thoughtful manipulation of tools and materials.

### Why the Sequence of Courses as Shown?

To our knowledge there has been no thorough research on this problem and there are reasons why each course can best be offered at any level. Duplicating is offered first in West Allis because there is less danger of personal injuries encountered in the duplicating work than perhaps in metalwork where hot metals, power machines, and the like are handled. Errors in setting type can be corrected without wasting materials. Errors in such a shop as woodwork would mean the purchase of additional material. Drawing is located early in the schedule for the same reasons, and also because it will be used in all of the courses that follow. The ability to express one's ideas by means of drawing is a skill that should grow as the student makes contact with each new shop course. Wood is a comparably cheap and easy material to work with, and one, through which principles contained also in other industrial activities, can be learned. It follows drawing because it was thought important that the boys in drawing apply their skill to a practical problem as soon as possible. The number of tool operations used in junior-high-school electrical work are relatively few. Some of these will have been learned in the 8B woodworking course. The placement of electrical work in this particular school makes possible correlations and applications with the electrical work in science. Drawing knowledge and skill previously learned are helpful in the work. Metalwork is scheduled last because of the nature of the equipment and materials found in this course. The media is harder to work with, and measurements worked to are closer than in preceding courses. Since the general metal course covers so many metalworking activities, two semesters are devoted to the work. Perhaps the subjects appearing early in the schedule are not penalized as much as would appear at first sight because many of the skills and information units develop and become more vital through use in the crafts that follow.

### How Many Shops, and What Activities in Each Shop?

The number of activities and the number of students required two shops. Two rooms provided for more shop space than was needed by 250 boys (one half the school population) but one would not be adequate. Two shops would permit expansion to 700 school enrollment. In case of further addition to the enrollment the plan calls for a third shop for drawing. The three shops could then take care of a school population of 1,200.

Duplicating, general drawing, and general woodwork were planned for one shop and general electricity and general metal were planned for the second shop. Plans called for teaching one general activity at a time such as general woodwork, wherein the equipment provided was to take care of 36 students in a general but closely related activity at a time rather than 12 students in duplicating, 12 in drawing, 12 in woodwork.

### Why Not Two Duplicate Shops With the Five Activities Taught in Each?

Even with scheduling each of the activities listed in the course of study separately, the teacher has to handle several distinct kinds of work in two of the courses. In duplicating, for example, printing, ditto-ing, block printing, stenciling, and the like, are going on at one time. In the metalwork, benchwork, machine-shop work, forging, sheet metal, and molding are being taught simultaneously. It did not seem advisable, therefore, where large numbers are taught in industrial-arts classes, to decrease the effectiveness of the instruction by adding unrelated activities in each shop. Some of the advantages in organizing the work around a related field of work are:

1. Organized instruction and testing can be carried on for the whole class when it is advisable.
2. There is much less confusion among students than in the general shop course.
3. The comprehensive unit course has in it those things that are naturally related and tend to give the student a more accurate sampling of a large industrial field of work.

It is believed that at least one semester is needed to meet junior-high-school objectives in industrial arts with the usual time allotment.

Homer J. Smith, Professor of Industrial Education, University of Minnesota, has said "I believe a junior high school should have six industrial arts subjects, one for each semester, and am opposed to the short-unit courses of six or eight or ten weeks' length. I can't get my objectives attained in less than a semester. The informational and guidance elements are too important."[2]

The shop sizes were tentatively set at from 25 to 30 ft. wide and 60 to 62 ft. long in order to provide ample room for a class size of 36 students. Experience based on present shops and a study of shop plans indicated that space to be necessary.

With the foregoing facts relative to activities to be taught, enrollment data, etc., in mind it was possible to determine the number of benches, machines, and approximate list of hand tools needed. This data used in connection with costs of equipment in previously equipped shops was used as a basis for estimating the cost of the equipment for the shops. The figure arrived at was given the superintendent as the amount to be put in the bond issue to equip the two shops.

The next problem was to work with the architect in arriving at a plan for that part of the building which was to be used for shops. In order to give the architect the information he needed it was necessary to carefully work out detailed floor plans with specifications. These were based on needs. Previously was given the planning to determine the number of shops, what was to be taught in them, and the approximate amount of money needed to equip them. Analysis of work to be done in each activity was one factor in determining the bench, machine, hand-tool, and instrument lists. Shop organization and method of teaching were other determining factors. Knowing bench sizes, machine sizes, seating-area sizes, requirements for storage, washing facilities, power, number of students to be accommodated, and the like, based on the determining factors mentioned before, it was possible to lay out the tentative floor plans and specifications.

**Tentative Specifications for the General Metal Shop, Second Floor of the John Dewey Junior High School, West Allis, Wisconsin**

*No. 1. Washbasin.* Washbasins are to be large enough to accommodate at least six boys at one time. They are located directly below those on the second floor and next to an inside wall, thus eliminating a high cost for plumbing. Hot and cold water are to be available.

*No. 2. Metalwork Bench.* Those benches indicated in the drawing by a number "2" are of special design for the West Allis shops. A detailed drawing is appended herewith. It will be noted that the back and end surfaces of the bench have no projecting surfaces so that the benches can be set up in sets as is indicated in the floor plan. Lockers are provided in these benches to meet the needs of all boys taking work in the shop.

*No. 3. Bookshelf.* This is a built-in book cabinet with glass doors and a means of locking the same.

*No. 4. Blackboards.*

*No. 5. Vertical Metal Supply Rack.* Ten spaces are provided in the supply room for the storage of metal on end. This provides a safe, convenient, and compact method of keeping the long stock in order.

*No. 6. Shaper.* This is a small shaper of the 1 h.p. size. It is located in the machine metalworking area of the shop near the 220-volt outlet for the spot welder, No. 29.

*No. 7. Bench Drill.* This ½-h.p. drill is located on opposite side of the shop from the other drill in order to make it more easily available for these in that area of the shop. No. 24 in the plan indicates a 220-volt outlet. this being the suggested voltage for all power machines.

*No. 8. Hack Saw ¼ H.P.* This machine is located near the metal supply and in such a position that long stock can be cut.

*No. 9. Squaring Shear.* The shear is placed at the end of the sheet-metal table so that long stock of this gauge may be cut with a minimum of danger. The machine is provided with a short-piece box to hold small pieces of metal until they can be used up.

*Figure 1. Tentative Specifications.*

[2]Abstract of an address before the Wisconsin Industrial Arts Association, Milwaukee, Wis., November 2, 1933.

The first nine items of the set of specifications which accompanied the suggested floor plan of the general metal shop given the architect are shown in Figure 1. Some forty items were listed. The numbers refer to items in the tentative floor plan to which the specifications were attached.

ing is 29 ft. 6 in. by 72 ft. 6 in. including the supply room and the finishing room. A general view of the shop is shown in Figure 4. Seventeen workbenches are placed in this room so as to provide for an even distribution of students over the floor space. The elimination of crowded areas materially

at the beginning and closing of the period and helps to keep the room clean and orderly in appearance. The bench is designed so that it will serve as a woodworking bench, a typesetting stand and worktable, and a drawing bench. The use of the bench for drawing is shown in Figure 5.

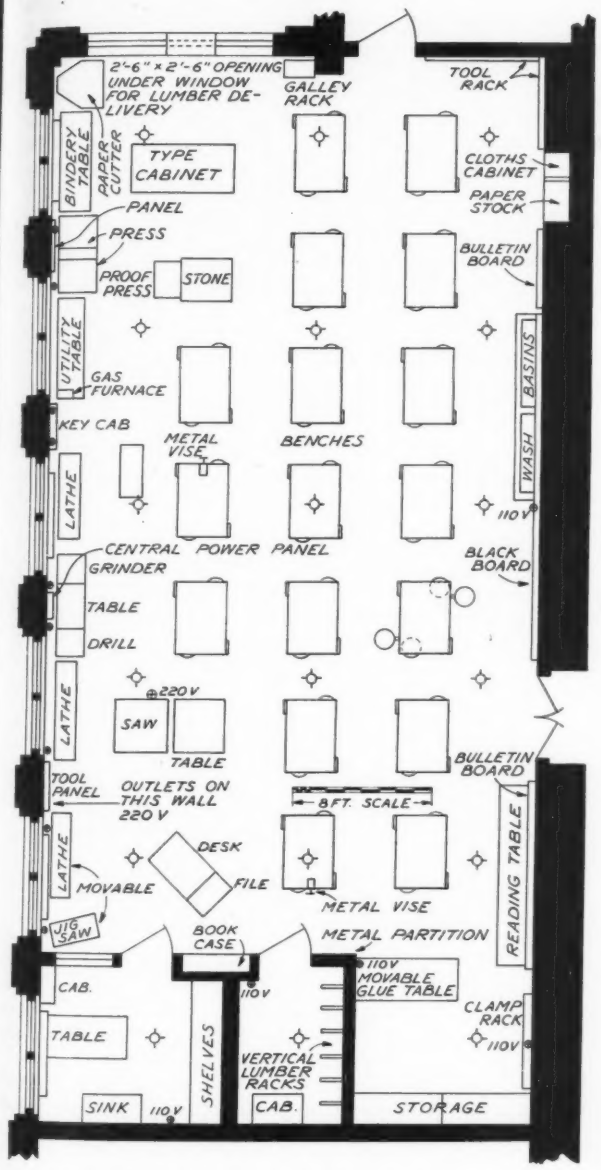


*Fig. 2. General Shop (Duplicating, Drawing and Woodworking) 29 ft. 6 in. by 62 ft. 6 in.*

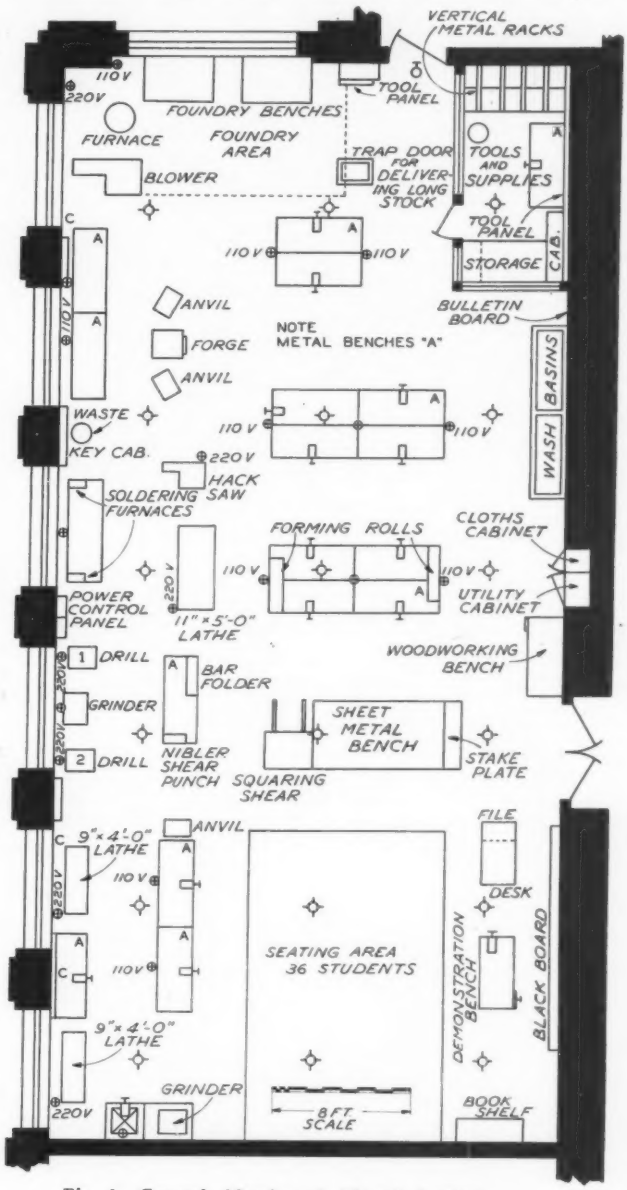


*Fig. 3. General Metal and Electrical Shop — 29 ft. 6 in. by 62 ft. 6 in.*

The tentative requirements of the several departments involved were put into a preliminary plan by the school architect. After a series of meetings, adjustments were made in room space and shop space so that requirements for the whole school were met. The shop plans were revised twice before the final plans and specifications were incorporated into the final building plans. Figure 2 is the floor plan of the first floor shop and Figure 3 is the floor plan of the general metal and electrical shop.

The shop on the first floor of the building is 29 ft. 6 in. by 72 ft. 6 in. including the supply room and the finishing room. A general view of the shop is shown in Figure 4. Seventeen workbenches are placed in this room so as to provide for an even distribution of students over the floor space. The elimination of crowded areas materially decreases the possibility of personnel problems in the class. These benches were designed to proved adequate, clean, flat, working surfaces for all of the general work to be done in the different groups. Each bench accommodates two boys, one on each side, and provides each with a woodworking vise, a tool drawer, a private locker, and an adjustable stool. Since each bench has six lockers on a side, in addition to the tool drawer, twelve boys may have a locker in the same bench. This arrangement eliminates a great deal of delay and confusion at the beginning and closing of the period and helps to keep the room clean and orderly in appearance. The bench is designed so that it will serve as a woodworking bench, a typesetting stand and worktable, and a drawing bench. The use of the bench for drawing is shown in Figure 5. The disappearing seat makes the bench usable for seating pupils for study, discussion, notebook work, and the like. The benches provide a regularly assigned work station for all boys in the class.

The paper cutter, proof press, as well as the lead and slug cutter and the paper punch are located in the graphic-arts area as shown in Figure 6.

The built-in utility cabinet at the same end of the room provides the place from which the student clerk can issue supplies, instruction sheets, and some of the small

pieces of equipment such as the pantograph. Two 6½ by 10-in. pilot presses are mounted on a metal table in the printing area adjacent to the imposing stone.

All of the printing equipment is standard for that craft so that trade practices can be respected and applied in the light of the objectives of junior-high-school shopwork.

The equipment is planned so that when duplicating is taught, printing is the reservoir activity. Twenty boys may be accommodated in typesetting at one time. Presswork, dittoing, stenciling, block printing, stamp lettering, bookbinding, and other units in the duplicating work may be done as the equipment is available when needed by a student. This plan facilitates handling large classes with minimum equipment. As was indicated previously, several distinct kinds of work are going on in a given course. It will be seen that the addition of unrelated activities would multiply the difficulties of the teacher and decrease the effectiveness of his work.

General drawing which follows duplicating in seventh grade is organized on much the same plan although in this work all of the boys start at about the same activities and proceed as individual capacities suggest. See Figure 7.

There are certain advantages in offering drawing in a shop as it is often possible to demonstrate the use of drawing through machines that are part of the equipment, and also through projects in the process of construction in other classes.

*Fig. 4. A class in general woodwork*

*Fig. 5*

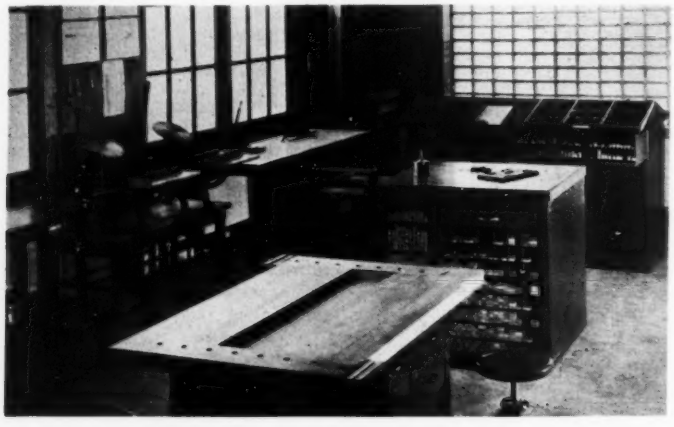

*Fig. 6*

This room has Florentine glass windows and a glass-brick wall which provides excellent diffused light, thus affording a maximum of light at all times. In addition the ceiling and walls are white, which, with the light maple bench tops, provide nearly perfect natural light conditions. Indirect, and powerful overhead lights give adequate light when it is needed.

General woodwork is the third subject to be offered in this shop. This is also a comprehensive unit course which provides accurate experiences in studying woods and the changes that can be made in them with tools. Each boy has a regularly assigned work station where he does his benchwork. He uses the machines, and the assembling and finishing facilities, as occasion arises.

A finishing room with an outside window and a window toward the main part of the room provides the working area for handling finishing materials. It is equipped with built-in shelves to hold projects, a sink with hot and cold water, a metal finishing table, and supply cabinet. See Figure 8.

Another room, adjacent to the finishing room, has racks for the vertical storage of lumber, and a large metal supply cabinet. As this room can be made dark and has 110-volt outlets it can be used for blueprinting and even for photography in the arts-and-crafts-club activities.

A third space at the same end of the room is used for a hot gluing, and storage space for partly finished projects. It has built-in shelves of different sizes for this purpose. The shop is equipped with a key cabinet so arranged that only the keys needed for one class are exposed at one time, a teacher's desk and file, a large built-in bookcase for shop reference books, and since the shop is used for arts-and-craft clubs there is provided an acidproof utility table, a gas furnace, three machinist vises, an anvil, and a few of the most common hand metal tools.

All of the wall space in the shop that is not used for bulletin board or blackboard is paneled with ¾-in. plywood to a height of 7 ft. It is thus possible to place tools on panels so that they can be used without loss of time. See Figure 9. This system elimi-

nates the traditional line-up in front of the tool crib and saves at least 10 minutes per day of student time. Misplaced tools are immediately identified by the vacant place on the panel.

Power machines consisting of a jig saw, three lathes, a drill press, a bench grinder, a universal saw, and a jointer are included in the equipment. The first five machines may be used with the instructor's permission, while setups and adjustments are made by the student on the latter machines with actual operation being performed by the instructor. It is felt that the 8th-grade student will learn much about using the saw and the jointer without actually being exposed to the danger of operating them.

All machines are powered with 220-volt motors assuring minimum maintenance costs. They are also provided with undervoltage and overvoltage switches, as a protection to the motors and to secure maximum safety for the students. A central distributing panel controls all power machines and outlets. All machines must pass the Wisconsin Electrical Code and the Wisconsin Industrial Commission inspection. The type of machines used and their arrangements are shown in Figure 10.

The general metal- and electrical-shop layout shown in Figure 3 was worked out on a different plan than was used with the general wood shop. The machine tools and facilities make it possible to teach electrical work, bench metal, machine metalwork, sheet metal, art metal, metal spinning, forge work and heat treating, and foundry practice. The woodworking bench and demonstration bench provide facilities to do some woodwork, and to make and repair patterns and the like.

*Fig. 7*

*Fig. 8*

The standard benches of which there are 17 in this shop, accommodate two boys each. These benches are equipped with lockers for six classes and a drawer space for wood panels to be used for electrical work. They are grouped so that 110-volt outlets could be provided without having too many floor outlets. The sets of four benches have

*Fig. 9*

an outlet at both ends for two plugs and a combination outlet box in a central location. Portable transformers for low voltages also are available. A utility cabinet in a central location is useful for various purposes such as often arise in the arts-and-crafts activity periods.

This shop has a seating area, as shown in Figure 11, because the metal-top benches could not be designed to provide suitable facilities for seating the students. This area is provided with a demonstration bench, a teacher's desk and file, a large bookcase, and 36 stationary chairs. Students can be comfortably seated for demonstrations, movies, tests, and notebook work. Adequate blackboard space is to be found at the front of the class.

Back of the demonstration area is a bench grinder, two small engine lathes and

*Fig. 10. Part of the power woodworking equipment*

benchwork stations for 8 boys. See Figure 12. Two power drills, with different ranges of speeds and a stationary grinder, are also located in the power metalworking area. See Figure 13. The large lathe which is equipped with milling attachments is set out in the center of the floor so that demonstrations can be more easily seen by the boys. A power saw is located at the end of this machine in such a way as to make it possible to cut long stock without closing up important travel paths in the room. Machines are equipped with 220-volt motors and safety controls as were described for the woodworking power equipment. There is sufficient room available to add two lathes, a spot welder, and a shaper which are to be purchased later.

*Fig. 11*

The large, flat, wood-top, sheet-metal layout table at the left of the demonstration area, as shown in Figure 11, has three shelves for sheet-metal storage underneath. A table suitable for holding sheet-metal machines, a standard small squaring shear, and a hand nib and punch is located near the sheet-metal table. See Figure 14.

*Fig. 12*

*Fig. 13. Part of the power metalworking equipment*

The soldering table is of standard metal construction and has a special acid- and heat-resisting top. Two soldering furnaces and a gas torch are part of this unit.

As shown in Figure 15, two anvils on cast metal bases and a standard forging furnace stand in a free area. This tends to decrease the danger from the handling of hot metals. Gas and air are brought to the furnace through the floor.

The foundry unit has a small but practical, standard melting furance, and a power blower which also provides air for the torch and the forging furnace. This is shown in Figure 16. The molding bins are of metal and hold sufficient molding sand for a number of classes. Floor area is provided for the molds.

A combination of the toolroom and open-panel plan is used in this shop. The larger, much used tools are placed on panels in the shop while the less frequently used and expensive tools, such as calipers and electric meters, are checked out on tool checks. This cuts down waiting time at the toolroom to a minimum.

The supply room has metal screening on all open sides and it is possible to see all parts of the supply room from any position in the shop. Provision is made for the storage of stock on end. This method takes less space and any piece of material can be secured with out repiling the stock. A large metal supply cabinet holds metal fastenings and other electrical and metal supplies. There is also a standard workbench in this room so that the supply men may work at their own projects if they are not busy with their special duties. See Figure 17.

A metal trap door in the floor of the shop, facilitates the transfer of long stock between the shops.

Both shops are equipped with washing facilities and it is possible for the whole class to wash in a short time. The writers believe that the need for saving student time is very important. This becomes quite apparent when the school costs per pupil hour of instruction is considered. Saving time on non-educative activities allows more time for worth-while experiences and makes the school more efficient.

After having completed the plans for the shops it was necessary to prepare equipment lists which would form the basis for the specifications to be submitted for bids. The analysis was made of each kind of work that was intended to be done in each shop. Information needed by the board of education for the purchase of the equipment was prepared. It included: (1) General instructions to bidder; (2) quantities, plans, and specifications for benches; (3) quantities, specifications for machines, and attachments; (4) quantities, catalog numbers, and descriptions of hand tools and miscellaneous equipment. From this information instructions and lists of requirements were prepared for bidders. Samples of this material follow.

## GENERAL INSTRUCTIONS TO BIDDERS

Equipment for Woodshop, Metal Shop, and Print Shop
At John Dewey Junior High School, West Allis, Wis.

1. All bids are to be sealed and addressed to the board of education of the City of West Allis, Wis., and there shall appear upon the envelope of each bid the name and address of the bidder and contents of envelope.

2. Bids must be accompanied by a certified check in the sum of 5 per cent of the total of each bid. Said check will be returned to unsuccessful bidders upon signing of contract.

3. The right is especially reserved to reject any or all bids; to award items or groups separately, also to order within 10 per cent more or less of amounts specified. The board of education also reserves the right to judge what items are the equal of those specified.

4. Bidder is to completely specify machines as to size, capacity, weight, size and kind of bearings, details of construction, kind of material from which made, and such other information as is deemed pertinent.

On benches, the bidder is to furnish complete specifications as to design, construction details, specifications of materials to be used, finish and other pertinent information.

On all other articles, bidder is to furnish descriptive literature with complete specifications of equipment quoted.

5. Prices quoted are to include delivery of the benches or machines and setting them up on floor of school shop in West Allis, Wis. Electrical connections will be made by board-of-education employees. On all other equipment prices are also to include delivery to school in West Allis, Wis. Where quantities exceed one, specify unit prices.

6. Machines are to be guarded so as to pass inspection of the Wisconsin Industrial Commission, and to meet the Wisconsin electrical code.

7. Prices quoted are to cover entire cost of machine complete with bases, belts or other connection to motor, motor, and controls.

8. Machines are to come equipped with push-button control, and with overload and undervoltage motor protection.

9. Bidder is to specify motor completely as to horsepower, type, kind of bearings, and rating. Motors are to be Allis Chalmers or equal. Must be 220-volt, A.C., 3-phase, 60-cycle motor unless bidder is given other instructions.

10. Bidder may quote on items which are equal to those listed. When an item is substituted for the one listed, specify substitute on quotation sheet.

### Bench Specifications

For Woodshop and Metal Shop
At the John Dewey Junior High School, West Allis, Wis.

A. *Woodwork Benches:*

Double woodworking bench made according to board-of-education drawing entitled "Special double-manual-training benches for Public Schools, West Allis, Wisconsin."

The bench is to be made entirely of metal except top which must be wood. Color of bench is to be olive green. Two keys shall be furnished for each lock together with three master keys. Vises are to be listed and priced separately unless they are an integral part of the bench. A standard bench of essentially the same size, capacity, and usefulness may also be quoted as an alternate proposal. Bidder is to submit drawing of bench quoted.

*Fig. 14*

*Fig. 15*

B. *Metalwork Benches:*

Made according to board-of-education drawing entitled "West Allis Public School Metal Bench." Bench is to be made entirely of metal. Color of bench is to be olive green. Each drawer shall be equipped with a lock. There shall be two keys for each lock and three master keys. Bidder may quote on comparable standard metal bench of essentially the same size, capacity, and usefulness. Bidder is to submit drawing of bench quoted.

### Power-Tool Specifications

For the General Metal Shop
At the John Dewey Junior High School, West Allis, Wis.

See sheet on "General Instructions to Bidders."

A. *Lathe:*

Lathe, 11- to 12-in. swing, quick change, speeds (approx.) 23 to 600 r.p.m., ¾-h.p. motor, thread-cutting range 2 to 112, underneath or pedestal drive, 28 in. to 40 in. between centers and chip pan. Each motor to have the following equipment: taper-turning attachment 10 in. (approx.) at one setting, thread dial indicator, milling and key-cutting attachment, center rest. 7½ in. — 4-jaw independent chuck fitted to lathe; 3-jaw drill chuck ¼ in. capacity fitted to lathe; toolholders, one straight, one right, and one left; boring-tool holder; cutting-off tool; 4 lathe

*Fig. 16*

dogs — ½, ¾, 1, and 1½ in.; six cutters for toolholders; boring-tool holders; cutting-off holder; milling cutters; plain milling cutter — ⅜ in. width of face, 2½ in. diam.; 1-side milling cutter — ¾ in. width of face, 4 in. diam.; arbor for the foregoing cutters; spiral end mill ½ in. diam., threading-tool holder; knurling tool, and medium knurl.

B. *Lathe:*

Lathe 9- to 10-in. swing, standard gear change, with power cross-feed, speed approx. 39 to 600 r.p.m., ¼-h.p., pedestal-drive approx. 24 in. between centers, back geared, screw cutting, with chip pan. Motor to be equipped with: 5-in. faceplate; tool post; centers, independent change gears; one 6-in. independent heavy-duty 4-jaw chuck fitted to lathe; toolholder; six cutters for toolholder; boring-tool holder; cutting-off toolholder; 4 lathe dogs — ½, ¾, 1, 1¼ in.; toolholders, 1 straight, 1 right, and 1 left; and a threading-tool holder; knurling tool (fine), thread indicator.

C. *Lathe:*

Same as Specification B except no threading tool or knurling tool included, and without power cross-feed.

The following shows a sample bid form covering lathe *A*, specified in the foregoing.

**Metal-Shop Power Tools**

John Dewey Junior High School

Bids will be received not later than July 22, 1938, at 4:00 p.m., to be opened July 25, at 8 p.m.

| *Quan.* | *Units* | *Catalog Nos.* | *Names and Descriptions* | *Unit Price* | *Net Quantity Price* |
|---|---|---|---|---|---|
| 1 | | | Lathe — Specification A, complete with regular lathe equipment | | |
| | | | Motor names — H.P. | | |
| | | | Reversing switch | | |
| | | | Push-button control having overload and under-voltage protection | | |
| | | | Wiring, v belt, and flat leather belt | | |
| | | | Center rest No. | | |
| | | | Milling and keyway cutting attachment No. | | |
| | | | Arbor for side and plain milling cutters No. | | |
| | | | ½-in. Spiral end mill No. | | |
| | | | ⅜-in. Plain milling cutter No. | | |
| | | | ¼-in. Side milling cutter No. | | |
| | | | Chip pan for above lathe No. | | |
| | | | Thread dial indicator No. | | |
| | | | Graduated taper attachment No. | | |
| | | | 7½-in. 4-jaw independent lathe chuck with reversible jaws, fitted to lathe No. | | |
| | | | 3-jaw drill chuck, ¾ in. cap. No. | | |
| | | | Solid arbor, fitted to above drill chuck No. | | |
| | | | Boring-tool holder, style *B* No. | | |
| | | | Straight cutting-off tool No. | | |
| | | | Right-hand turning-tool holder No. | | |
| | | | Left-hand turning-tool holder No. | | |
| | | | Straight turning-tool holder No. | | |
| | | | Set (6) Hi-speed cutter bits unground No. | | |
| | | | Knurling-tool holder with medium knurls No. | | |
| | | | Threading-tool holder No. | | |
| | | | Set (4) standard lathe dogs, ½, ¾, 1, and 1½ in. | | |
| | | | Total for Lathe — Spec. A | | |

BIDDER IS TO STATE EARLIEST POSSIBLE DELIVERY DATE ON EACH ITEM.

Bids were advertised for. Each bidder received a set of general instructions to bidders, specification sheets, and bid sheets. At the date set the bids were opened and orders were placed on the bids received.

The preparation of maintenance-department requisitions for installation work completed the task of equipping the shops. A careful check of work to be done was made. Each job was listed in the requisition, with complete instructions as to what was to be done by the maintenance department. Where sketches were necessary they were made and numbered and mentioned in the requisition item.

### Sample of Work Requisition on Maintenance Department

1. Install electrical outlets on benches as marked and make electrical connection to outlet on end of benches. Those benches that are back to back as in the center of the room should be 2 in. apart to allow for the conduit. This 2-in. space should be filled with 2 by 4-in. hardwood (maple, birch, oak) set flush with top and ends of benches. Benches should be bolted together through these 2 by 4-in. pieces.

### Conclusion

Shops planned and equipped as those described meet the requirements of a diversified industrial-arts program. They provide for flexibility in things to be made. There is adequate space for work, and facilities for good workmanship on the part of the student are available. Teaching conditions are right for making the most out of what industrial arts has to offer in adding to desirable experiences of the junior-high-school student.

*Fig. 17*

# Industrial Arts in A.V.A. Programs

## Homer J. Smith

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*Minneapolis, Minnesota*

*Dr. Smith has prepared this article in his new capacity of vice-president of the American Vocational Association, representing Industrial Arts.*

It is certain that many regular readers of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION have not yet attended an annual convention of the American Vocational Association. Many of them may not have seen copies of the quarterly *Journal and News Letter*, official organ of the A.V.A., nor examined a final convention program. These assumptions have led to the preparation of this statement. The aim, here, is to afford some sense of the specific and varied responsibilities of this important professional group — an association of more than twenty thousand members.

As our title indicates, chief attention is given to that phase of education commonly known as industrial arts. This emphasis is made because of high current interest in the amount of industrial-arts materials appearing in convention programs or in the extent to which this field may have been ignored or stifled. It seems desirable that facts be used in support of the contention that industrial-arts teachers have much to gain through membership in the A.V.A.

and from attendance at its annual conventions when this can be arranged. Inasmuch as many are uninformed, and some misinformed, it seems appropriate that we heed the familiar suggestion of a prominent American — "Let's take a look at the record."

The notes here made have but one source, the printed program bulletins covering all annual conventions since the group in question adopted the name — American Vocational Association, Inc. In one instance only the advance, tentative program was available. The thirteen years, with the meeting places, are as follows: 1926, Louisville; 1927, Los Angeles; 1928, Philadelphia; 1929, New Orleans; 1930, Milwaukee; 1931, New York City; 1932, Kansas City; 1933, Detroit; 1934, Pittsburgh; 1935, Chicago; 1936, San Antonio; 1937, Baltimore; and 1938, St. Louis. (The 1939 Convention will be held at Grand Rapids on December 6–9. It is designated the thirty-third meeting because the A.V.A. stemmed from rugged societies that had labored similarly for a justifying number of years.)

### Scatter of Interests

Certain groupings of members have been common to all conventions. There have been one-to-many sessions, under each of these classifications, every year since 1926. Following are the constant or recognized divisions of interest:

Agricultural Education
Civilian Vocational Rehabilitation
Commercial Education
General Sessions
Home-Economics Education
*Industrial-Arts Education (Except 1926)*
Part-Time and Continuation Education
Trade and Industrial Education
Vocational Guidance

Industrial arts not only finds place in the list but has been able to maintain equality in number of meetings, publicity coverage, publication of convention papers, and the like. Aside from the question of status there is an important consideration. The A.V.A. convention affords opportunity for industrial-arts teachers to profit by the continually advancing concepts and practices of the other fields. Progress would be more certain and more rapid if each special group were to make greater effort to know and to use the most effective devices of the others.

Certain sets of professional workers have held meetings with such regularity as to render their sessions rather standard parts of convention weeks. The number of such cooperating or affiliated societies is increasing. Industrial arts has interest here because of close relationship that should exist among all who work for the betterment of students, young or old. Time spent by industrial-arts teachers in attendance at meetings of teacher trainers, co-ordinators, and the like, would be time spent interestingly and profitably.

State Directors of Vocational Education
State Supervisors of Agriculture, Home Economics, Trade and Industrial Education (Separately)
Teacher Trainers representing the above services
Trade-School Principals
Co-ordinators
Local Administrators of "practical-arts" programs

Discussion days or half days have frequently been devoted to the following topics and the number of such conferences is increasing. There can be no question of the value to industrial-arts teachers of the insights and appreciations to be gained through these meetings. Here they may gain perspective and become better able to evaluate their own efforts and the assumed outcomes of their work.

Adult Education
Technical Training
Apprenticeship
Foremanship
Plant Training
Leisure
Pre-employment
Safety Education
Girls' and Women's Occupations

Special programs have often been conducted relative to a number of subjects or occupational types including those here listed. The writer is aware that such discussions have a worth-while transfer effect for industrial-arts teachers and even for teachers of academic branches. Parallel situations, similar rather than identical, always present themselves in such meetings and new methods of attack upon one's own problems come to mind because of them.

Plumbing
Printing
Decorating
Electrical Trades
Building Trades
Textile Trades
Restaurant Industries
Chemical Industries
Marine Occupations
Airplane Trades
Metal Trades
Public-Service Occupations

Breakfast, luncheon, and dinner meetings have averaged about twenty annually. They have matched the social and professional desires of college alumni groups, members of fraternities, and sponsors of continuing or new aims and projects.

Special mention must be made of the *Annual Banquets,* the sessions of the *House of Delegates,* and the programs offered by *The Ship*. These are occasions increasing one's professional pride and fostering the whole-group spirit. In addition, handled at A.V.A. with marked efficiency, are the arrangements for commercial exhibits — the visits to industries, schools, and museums — the general city tours — the entertainment of ladies who attend but who are not expected to spend full time in regular meetings. People present at these conventions never lack the call to activity; there is much to see, to hear, and to do. Even the closer association with leaders in the movement is a valuable return on the effort and cost of attendance. There is too little recognition of the usefulness of convention contacts aside from their pleasurable aspects.

Excluding industrial arts, omitting meal meetings, and without counting themes of sessions, the number of topics or presentations each year is a surprising total. Close approximations for the past seven years give us the following numbers of persons who have appeared on programs, 200–165–190–185–210–230–200. What man or woman in educational work of any kind could fail to find something helpful in such an array? What industrial-arts worker could escape assistance and encouragement, even if there were not a single session in his realm? Most members of all groups incline to withdraw and intensify, rather than to mingle and broaden. This tendency on the part of industrial-arts teachers is strong, and we now show that worthy answer has been made to their desires.

### Industrial-Arts Sessions

The A.V.A., during these thirteen years, has not overlooked this special field. The writer admits surprise at the number of definitely labeled sessions that have been planned. There was no industrial-arts program in 1926, but since that year there has been an average of four sessions of this type, affording an average of ten or a dozen addresses. Moreover, we find that, at each and every convention, industrial-arts addresses have been made as parts of other programs. The number of industrial-arts meetings and of "outside" industrial-arts presentations are here shown by years.

| 1926—0 | Meetings—4 | Outside | Addresses |
|---|---|---|---|
| 1927–3–3 | 1930–2–3 | 1933–5–8 | 1936–5– 5 |
| 1928–4–4 | 1931–3–4 | 1934–6–8 | 1937–5– 9 |
| 1929–4–2 | 1932–4–3 | 1935–6–6 | 1938–5–12 |

We see that leaders with industrial-arts background and enthusiasm have been active in the A.V.A. for more than a decade, and memory will serve many of us concerning earlier times. We are aware of strength gathered and of better feeling in recent years because of representation on the Executive Committee and by reason of Professor Selvidge's most competent service at that post. It is important to remember, nevertheless, that acceptance and progress in the A.V.A. has been true since birth of the present association. Insofar as programs are concerned, there is no other major division that has made advance comparable to that of the industrial-arts forces.

### The Titles of Addresses

There follow the actual titles of addresses and the topics used for discussion in connection with industrial-arts themes. They form an extended and respectable list. They suggest content, not unlike that to which we have become accustomed at local, state, and regional gatherings of the clan. It may be added that these titles, and the men who have used them, have proved attractive. With natural exception of the general sessions of the conventions, the industrial-arts meetings have shown favorable and, recently, largest attendance. Knowledge of these facts explains the surprise or shock experienced by many leaders recently when they began to hear that industrial arts has failed in the A.V.A. and that real programs are impossible. The following titles are offered in evidence that forward-looking programs have really been attained.

Guidance Through Exploratory Experiences
Guidance Values of the Manual Arts
The Fundamental Service of the Industrial Arts in the Public-School Program

The Destiny of Industrial Arts in the Senior High School
Uses Which the Current Newer Methods of Education Can Be Made to Serve in Industrial-Arts Instruction
Objectives of Industrial-Arts Instruction in the Junior High School
The Contribution of Industrial Activities to the Junior-High-School Plan
Industrial Arts and the Industrial-Arts Teacher in the Junior-High-School Program
Means of Developing in the Teacher the Right Outlook Upon the Problems of the School in General and the Industrial Arts in Particular
Upgrading Industrial-Arts Teachers in Service
Common Standards of Accomplishment as a Basis for Teaching Industrial Arts
Tests and Measurements in Industrial Arts
Organization and Management of the School Shop
Definition and Function of the General Shop
The Place of Individual Instruction Sheets in Industrial-Arts Teaching
Why Printing Is Taught in the Schools of Chicago
Printing Production Versus Instruction in the Junior High School
The Relations of the Fine Arts, English, and Design to Printing
Printing Instruction (Objectives — Professionalism — Craftsmanship)
Significance to the Manual-Arts Program of Current Beliefs in Regard to Individual Differences
The Cost of Manual-Arts Instruction
The Function, Character, and Organization of Industrial Activities in the Elementary Schools
What Wisconsin is Doing in the Development of Objectives and Standards in Industrial Arts
What Michigan Has Done
What the Michigan Society for Manual Arts and Industrial Education is Attempting to Do
Common Standards of Accomplishment As A Basis for Teaching Industrial Arts
The Development of Attitude and Outlook in Manual-Arts Teachers
The Function of the General Shop and the Results of Experience in Its Organization and Conduct
How May We Improve the Art Element in Our Manual-Arts Work?
Common Errors in Technique and How To Correct Them
Use of Objective Tests by the Manual-Arts Teacher
Examples of Successful Industrial-Arts Programs (Birmingham, Richmond, Oklahoma City, a small city)
What Are Some of the Tests of Efficiency of an Industrial-Arts Program?
Symposium on the General Shop
The Relation of Industrial Arts to Trade and Industrial Education
Training Industrial-Arts Teachers
Good Practice in School Use of the General Shop (Instructional Implications — Appropriate Locations — Discussion)
Implication in Industrial-Arts Teaching Development (Testing As an Efficiency Factor — Training the Teachers — Discussion)
Junior-Mechanics Club Work as an Industrial-Arts Education Program
The Development of a State Program of Industrial-Arts Education
The Improvement of Industrial-Arts Teaching
Honoring Men Who Have Been Leaders in the Profession for Thirty Years or More
Status, Trends, and Outlook of Industrial Arts (The East — The South — The West Coast — The North Central States)
Operating Effectively on a Reduced Budget (The City Supervisor — The Classroom Teacher — The Small School)
The New York Luncheon
Clarification Through Concept Analysis
What Next in Physical Planning?
Accounting for Ourselves
The Challenge of the Future
Desirable Personal Characteristics and Traits of Industrial-Arts Teachers
Desirable Technical and Professional Training
What Teacher-Training Institutions Can Do in the Selection of Teachers and Training in Desirable Personal Characteristics and Traits
What Teacher-Training Institutions Can Do in Professional and Technical Training
Public and Professional Relationships (Epsilon Pi Tau Symposium)
Shopwork in the Cosmopolitan High School (A Panel Discussion)
Suggested Ideal Shop Program
Possibilities of Supplementary Technical Work in Shop Courses and Its Relation to College-Entrance Requirements
Cultural Values of Shopwork in the High School
Shopwork in the Canadian High Schools
What the Taxpayer Expects from Shopwork in the High Schools
Industrial Arts in the Reorganized Secondary School
Some Practical Experiments in Industrial Arts in the Secondary School
Guidance Through Industrial Arts in the Secondary Schools
Epsilon Pi Tau Symposium on Problem Solving and Research
The Objectives of the General Shop
Methods and Materials in General Shop Teaching
The General Shop Layout and Equipment
The Schools and Industry
A Program of Instruction in Industrial Arts for the Junior High School
Rich Opportunities for Correlation in Industrial Arts
Some Psychological Problems of Adolescence
Citizenship, Training to Work, and Delinquency
A Neglected Factor in the Acquisition of Skill
New Developments Demanded in the Full-Time Secondary-School Curriculum
The Training of the Junior Technician
The Adolescent, the Industrial Arts, and Industrial Education (Standpoint of the Superintendent of Schools)
The Better Balancing of Life Through Training in the Handicrafts
Industrial Arts in Its Service with Vocational Education
Industrial-Arts Curriculum Planning and Revision to Meet Social-Economic Needs
Changing Viewpoints in Assignment of Industrial-Arts Teachers
Breaking New Ground in 1936
New Organization of Industrial Arts
Industrial Arts and the Revised Curriculum
Graduate Work in Industrial-Arts Education
The Place of Industrial Arts in the Junior High School
The Function of Shop and Drawing Programs in the Senior High School
Designing for Industrial-Arts Projects Made Easier
Should the Public Support Industrial-Arts Instruction?
Reinforcements for a New Offensive Movement
Training the Whole Youth, Vocational Youth Organizations
Developing Desirable Attitudes Through Participating Experience in the Junior High School
Youth Looks Ahead
Intangibles
Industrial-Arts Design in the Senior High School
Industrial-Arts Adjustment Possibilities and Vocational Education
Industrial Arts, A Vital Service
Neglected Values in Industrial Arts
Craft Work in the Senior High School
Implications for Industrial Arts Involved in the New Federal Legislation for Vocational Education
The Work of the Texas Planning Committee on Industrial Arts
Organization and Learning in the Industrial Arts
Industrial Arts in the New England States
An Interpretation of Industrial Arts for American Schools
Industrial Arts and the Machine Age
Industrial Design Today
Adaptation of Design to Modern Needs
Good Taste in the Industrial Arts
Teaching Metalwork in the Junior High School
Industrial Arts in the Cosmopolitan High School
Trends of Industrial Arts in the Secondary Schools
Education Through Industrial Arts
Trends in Industrial Arts
Industrial Arts and Industrial Society
Safety Instruction, a Social Obligation
Safety, an Integral Part of the Industrial-Arts Curriculum
Behind-the-Wheel Instruction in Driving
Art Metal and Jewelry
Teaching Pottery in the High School
Bookbinding as an Industrial-Arts Subject
Some Obstacles to Be Overcome in Promoting an Adequate Program of Industrial Arts
Charles A. Bennett Testimonial Luncheon
The Reorganized Program for Industrial Arts

NOTE: There have been frequent reports by the Committee on Standards in Industrial-Arts Teaching and the Committee on Tests and Measurements in Industrial Arts.

### Speakers and Program Chairmen

There are listed following the last names of persons who have participated in special industrial-arts programs or who have used similar topics in other sessions. The first set contains 137 participants, each of whom has appeared from one to five times during the thirteen years. This large number reflects the far-flung meeting places of the conventions. Each reader may find some names with which he is not familiar. This fact argues the value of an Association with opportunity for representation of scattered working conditions and philosophies.

*One to five appearances:* Adams, Anthony, Ash, Ashley — Badger, Bingay, Boehing, Bogan, Bollinger, E. L. Bowman, Brown, Brunton, Burdick, Byrn — Castle, Cleeton, Cooper,

Coover, Cox, Cramlet, Cressman, Cushman — Davison, Day, Diamond, Dolly, Dougherty — Easton, Eckert, Edgerton, Engle — Fales, Fausold, Fenninger, Ferns, Filbey, Fintz, Friese — Gaither, Gallagher, Goldberger, Green, Grove — Hamilton, Hankammer, Hargitt, Harris, Haynes, Henson, Hill, Hinderman, Holbrook, Horridge, Houchens, Hunt, Hunter — Johnson — Kersey, Keyworth, Kitson, Kleinholz, Kunou — Lamb, Langley, Leavitt, Lee, Lindsey, London, Loucks, Lovell, Luddington — Maclin, Mansfield, Maverick, McHenry, Metz, Myers — Nelson, Newkirk, Nichols, Nihart, Noall, Novak — Park, Partch, Patrick, Peters, Phipps, Pickens, Pierce, Polk, Powers, Pratt — Radtke, Randel, Rees, Rigby, Rodgers, Root, Rosecrance, Rudolph, Rusch — Sanders, Sawyer, Schneider, Schoen, Schweickhard, Sears, Shannon, Sheldon, Sink, Small, J. W. Smith, L. W. Smith, Soffel, Spaulding, Speer, Stockwell — Tagg, Throssell, Trybom, Tustison — Van Westrienen, Van Oot — Wagner, Ward, Weber, Wells, Whitesitt, Whitney, Williamson, Willis, Wilson, Winslow, Winegar, Wise, Wood.

*Five to twelve appearances* have been made by fifteen men. Bawden has participated most often. Others are listed alphabetically and without reference to the frequencies at hand — Bauder, Bedell, Bowman, Christy, Ericson, Fryklund, Mays, Moore, Proffitt, Roberts, Selvidge, H. J. Smith, Van Duzee, and Warner.

When considering a list of this nature one must have time or age sharply in mind as well as circumstances likely to make convention attendance regular. Age is, probably, the heaviest modifier. A list for a spread of thirteen years, beginning either ten years earlier or ten years later than this one, would show marked difference. Some of our most important early leaders have largely ceased to participate; some young men now beginning to take part will come quickly to prominence. It should be pointed out here, with strong emphasis, that some persons in the group of 137 have probably surpassed some in the list of 15 in total appearances at A.V.A. conventions. We have been concerned here only with industrial-arts sessions, addresses, committee reports, and the like. Many men have made strong contributions to programs in a scatter of fields or services.

### The Grand Rapids Sessions

(December 6–9, 1939)

Industrial-arts programs for Grand Rapids are now in process of formation. These group meetings are expected to show attendance larger than usual, because of location and because Michigan and near-by states have progressive and well-organized workers in the industrial-arts field. As the vice-president having most direct responsibility for the A.V.A. activities of this special group, the writer has chosen to bring a large number into cooperation in planning. Suggestions as to half-day themes, individual topics, and speakers preferred have been assembled by use of a question form. This went initially to twenty-five scattered men and included requests that other persons be named to whom the same form would be sent. Thus, by continuing nomination, the list of helpers has grown to hundreds and represents every state of the Union. The response has been very gratifying and there are at hand valuable program recommendations as well as comments concerning other related matters.

Five members are now active, each one planning an industrial-arts session for the December meeting. These five sessions will occur on Thursday forenoon, Friday forenoon and afternoon, Saturday forenoon, and at the lunch hour on the same day. The Saturday-noon industrial-arts luncheon has become a feature of A.V.A. conventions. It provides a final instructive and social occasion for all classifications of the full membership. All who plan to be at Grand Rapids should see the next *A.V.A. Journal and News Letter*, which will show the total of meetings to occur before and during actual convention days.

### An Invitation

As suggested by the foregoing details, the American Vocational Association is worthy of the wholehearted, concrete support of all workers in all "practical" fields and subjects. This article cannot be extended to review the many reasons why industrial-arts instructors should become members, directly or through their affiliated state societies. This statement merely sets forth the multiple values of attendance at the annual conventions, which are characterized by size, diversity, smartness of sessions, and worth-while professional contacts. Industrial arts is one of the major divisions of the association. We are assured, therefore, that each succeeding year will bring a number of sessions on the problems of this special field. Perhaps, even more important is the opportunity that will be afforded each year for industrial-arts teachers to meet leaders and to make friends in the allied phases of education.

Among all classes of educational workers there are times and places for intimate discussion and detailed work. There are other times and places for acquaintance, for inspiration, for comparison and orientation, for the correlation and integration of effort. Attendance at the next annual convention of the American Vocational Association will be a pleasing and convincing experience of the latter kind.

# A Follow-Up Study

## Lester V. Hill

*Richmond Public Schools, Richmond, Virginia*

### Procedures and Scope of Investigation

The study reported herein was made to determine what effect trade instruction had in the lives of the graduates of three trade-training institutions of Virginia. The investigation was conducted by sending questionnaires to the day trade graduates of the three leading trade-training schools for Negroes in Virginia. The schools were:

1. Hampton Institute, Hampton, Va.
2. Virginia State College, Ettrick, Va.
3. Booker T. Washington High School, Norfolk, Va.

Only those individuals were included in the study who had graduated from the all-day trade classes in these schools from June, 1927, through to June, 1937. Two weeks after the questionnaires had been mailed to these graduates, a follow-up letter was sent to those who had not returned an answer.

Besides this, personal interviews were held with 80 of the graduates living in Norfolk, Va., and 40 living in Hampton, Va.

The things investigated were: (1) the occupational distribution of the graduates, (2) nature and extent of difficulties encountered by the graduates, and (3) what changes in the present trade-training courses would be recommended by the graduates. It seems that if the problem is investigated from these three aspects, and one can find some answer to two important questions, then this study should have fulfilled our purpose. The questions are:

1. Are we providing in our trade schools the training necessary to prepare our students to be efficient workers and intelligent citizens?

2. Do the curriculums of our trade schools need changing so as to meet local industrial needs?

### Interpretation of Results

*Graduates of Booker T. Washington High School.* The vocational department of this school offers two-year courses in carpentry and cabinetmaking, bricklaying, and auto mechanics. During the period June, 1927, to June, 1937, there were 144 trade graduates from this school. The most alarming results, as reported by this group, seems to be that 85 per cent of the grad-

| Date of graduation | Total replies | Distribution of trades taken | | | Working at trades? | |
|---|---|---|---|---|---|---|
| | | Cabinet-making | Brick-laying | Auto mechanics | Yes | No |
| 1926 | x | x | x | x | x | x |
| 1928 | 2 | 1 | x | 1 | x | 3 |
| 1929 | 3 | 2 | 1 | x | x | 3 |
| 1930 | 7 | 2 | 3 | 2 | 2 | 5 |
| 1931 | 7 | 3 | 2 | 2 | 1 | 6 |
| 1932 | 7 | 2 | 2 | 3 | 1 | 6 |
| 1933 | 9 | 4 | 2 | 3 | 1 | 8 |
| 1934 | 12 | 5 | 4 | 3 | 2 | 10 |
| 1935 | 10 | 3 | 4 | 3 | 3 | 7 |
| 1936 | 19 | 9 | 6 | 4 | 2 | 17 |
| 1937 | 15 | 8 | 4 | 3 | 2 | 13 |
| Totals | 91 | 39 | 28 | 24 | 14 | 77 |
| No. of ques. sent | 123 | 82 | 32 | 29 | | |
| Percentage of replies | 74 | 47 | 89 | 81 | 15 | 84.6 |

Eighty-five percent of the graduates are not working at their trades now, and 59 percent of them have never worked at their trades since graduation.

*Table I. Distribution of replies from trade graduates of Booker T. Washington High School, 1927–37.*

uates were not working at the trade for which they were trained. Moreover, as it may be observed from Table I, 59 per cent of the graduates have *never* worked at the trade for which they had received training. In view of such findings, the question arises: "Are we providing in our trade schools the type of training that is most effective in the life of the graduates?" Why are so many of the graduates working at occupations for which they were not trained?

The vocational training offered by the schools should in some way reflect the needs and resources of the community. It is only by a broad program, based on a survey of the needs of the local community, that the administration can determine what training to offer. Likewise, it is only through personal placement and follow-up services that the relative success of the graduates can be determined. It is only through such services that the school can determine whether its graduates are able to secure employment where they can use their training most effectively. The school should also know the approximate absorptive power of the various occupations of the community.

*Graduates of the three schools combined.* It should be remembered that while Booker T. Washington High School offered two-year trade courses, Virginia State College and Hampton Institute offered four-year courses. In the light of this, one would expect to find that the graduates of the Washington High School would have difficulties which would not be prevalent among the graduates from the other schools. While this undoubtedly was true yet some difficulties were common among all three groups of graduates. Therefore, the data may be combined for discussion.

| Schools | Nature of Occupations | No. | Per cent | Totals |
|---|---|---|---|---|
| Hampton Institute | Working at trades as mechanics | 102 | 54 | |
| | Working at trades as teachers | 35 | 18.7 | |
| | Working at allied occupations | 18 | 9 | |
| | Unemployed | 6 | 1 | |
| | Taking further training | 19 | 10 | |
| | Unrelated occupations | 13 | 6 | |
| | Working within trades | 155 | 83.5 | 186 |
| Virginia State College | Working at trades as mechanics | 11 | 52 | |
| | Working at trades as teachers | 4 | 19 | |
| | Working at allied occupations | 2 | 9 | |
| | Unemployed | 0 | 0 | |
| | Taking further training | 1 | 4.9 | |
| | Unrelated occupations | 3 | 14 | |
| | Working within trades | 17 | 80.9 | 21 |
| Booker T. Washington High School | Working at trades as mechanics | 14 | 15 | |
| | Working at trades as teachers | 0 | 0 | |
| | Working at allied occupations | 2 | 2 | |
| | Unemployed | 5 | 5 | |
| | Unrelated occupations | 69 | 75.8 | |
| | Working within trades | 16 | 17.5 | 91 |
| All Schools | Working at trades as mechanics | 127 | 41 | |
| | Working at trades as teachers | 39 | 12 | |
| | Working at allied occupations | 20 | 7 | |
| | Unemployed | 11 | 3 | |
| | Unrelated occupations | 85 | 29.5 | |
| | Working within trades | 186 | 62.2 | 298 |

*Table II. Occupational census of 289 graduates*

Considering the results, as compiled in Table II, it seems that about 63 per cent of the graduates considered in this study are either working at their trade or at allied occupations where their trade training is an important asset. It may be safe to say, then, that about 63 per cent of the group benefited directly by their trade training.

It will be observed from Table III that only 21 per cent of the graduates were placed on jobs by the schools and about 39 per cent found jobs themselves. The graduates were asked to report on the major difficulties that they had encountered while working at their trades as craftsmen. The condensed answers appear in Table IV. There was not one graduate replying who did not encounter some difficulty. However, 51 graduates reported difficulties, but did not classify them as major ones.

As already stated, the important issue of this study was to investigate employment problems among the graduates. However, unemployment among the graduates was surprisingly low, being only about 3 per cent. Also, it was found that turnover among the graduates was relatively small, for it was observed that 129 of the graduates had not held over ten different jobs; 27 had held the same number of jobs from three to four years; while 21 held ten jobs for over nine years. It is believed that this low turnover was due, in part, to the 12 per cent of graduates who are now teachers of their trades, as well as a large number of graduates who are tailors and own their business. Also, many carpenters reported that they were doing well as contractors and builders. Few if any of the graduates are to be found listed on the relief rolls as was charged by several social workers, and those tradesmen, who are listed by such agencies, are not formally trained craftsmen but rather are men who "picked up a trade."

## What the Graduates Recommend

The writer believes that one effective way of training efficient tradesmen and intelligent citizens would be to devise curriculums out of the richness of the experiences of those who are in the various occupational fields. Frequently the point of view of the coach on the side line differs greatly from the players under fire of the opposition. Not only is this true, but if there is to be an education that will reflect true democratic ideals it, too, must be "of the people, and by the people."

Contrary to popular belief, the tradesmen seem to be ambitious and seek to be efficient. The data of this study revealed that 8 per cent of the graduates had earned the B.S. degree; 16 per cent had not earned the B.S. degree, but had taken training beyond high-school graduation; while 7 per cent were still students at the time the data were compiled. Many of the graduates supplemented the questionnaire with a letter. Some of these expressed opinions as to the value of subjects as offered by the trade schools. Some examples follow:

"Would suggest that schools include courses in citizenship and make all training more practical as well as modern. Idealism has little importance out here as well as form of training tainted with 'Traditionalism.'"

"Matter of placing graduates should receive more attention by schools. Contact men should be placed in the field to spot openings before they really exist. Senior students should be placed in commercial shops for practical experience. This would serve a double purpose in that the shop would keep the school in mind when in need of a man, and the man would have an idea of what is expected of him by the trade."

"Contrary to the popular belief and practice of many trade schools, I have seen definite evidence to give me the opinion that it is a mistake to train young persons for a specific job in industry. This duty belongs to the industry — it is industry's job. And to my mind, our trade schools should offer vocational training as broad and as well planned as any course in the Liberal Arts field, so as to turn out qualified and competent persons. Our task is to give them general training so, for example, a boy can be turned out as an all round machinist. However, we never under any circumstances, should train students for jobs that do not exist; nor can we afford to train more people than any given industry can absorb. For instance, it would be silly to train blacksmiths at the present time, and though a shoemaker may be in demand here or there, the school should not undertake to set up expensive machinery just to accommodate one or two students."

"Trade training should correlate and compare favorably with the demands of a chosen field. In order to ascertain these demands, the

| Dates | School helped | Employment agencies | News ads | Relatives and friends | Personal survey | Other agencies |
|---|---|---|---|---|---|---|
| 1927 | 4 | x | 1 | 3 | 4 | |
| 1928 | 1 | x | x | 8 | 3 | |
| 1929 | 6 | 1 | 1 | 4 | 4 | |
| 1930 | 8 | 1 | x | 10 | 7 | Open own business |
| 1931 | 5 | x | x | 5 | 12 | |
| 1932 | 6 | 4 | x | 11 | 15 | Civil Service |
| 1933 | 8 | 1 | 2 | 5 | 9 | |
| 1934 | 5 | 2 | 2 | 14 | 15 | |
| 1935 | 3 | 1 | x | 7 | 14 | |
| 1936 | 7 | 2 | 1 | 13 | 18 | |
| 1937 | 5 | 1 | x | 11 | 10 | |
| Total | 59 | 13 | 7 | 91 | 111 | 15 |
| Percentage | 21 | 4 | 2 | 32 | 39 | 5 |

*Table III. Placement agencies as used by 305 graduates*

| Subjects | Taken in trade school | Value of subjects to you: Great Deal No. | Great Deal Per cent | Little No. | Little Per cent | None No. | None Per cent |
|---|---|---|---|---|---|---|---|
| English | 298 | 298 | 98 | 6 | 2 | | |
| Trade Math. | 274 | 253 | 91 | 20 | 7 | 6 | 2 |
| Gen. Science | 199 | 51 | 25.1 | 66 | 33.2 | 9 | 4 |
| Mech. Drg. | 273 | 111 | 40.9 | 28 | 10 | 4 | 1.8 |
| Shop Prac. | 290 | 289 | 99 | 1 | .04 | | |
| Trade Theory | 203 | 28 | 13.7 | 13 | 6.4 | 3 | 1 |
| Mechanics | 177 | 26 | 14.6 | 20 | 11.2 | 4 | 2.2 |
| Algebra | 188 | 24 | 14 | 73 | 38 | 92 | 48.9 |
| Geometry | 176 | 52 | 29.5 | 51 | 29 | 36 | 31.7 |
| Trig. | 166 | 40 | 24 | 37 | 22.2 | 31 | 18.9 |
| Indus. Hist. | 174 | 37 | 21.2 | 36 | 21 | 22 | 12.8 |
| Safety Ed. | 178 | 28 | 15.8 | 22 | 12.3 | 8 | 4.5 |
| Physical Ed. | 167 | 29 | 17.3 | 29 | 12.3 | 36 | 21.4 |
| Physics | 186 | 36 | 19.3 | 35 | 19 | 18 | 9 |
| Chemistry | 112 | 21 | 18.7 | 35 | 31.2 | 19 | 16.9 |
| Bus. Methods | 97 | 36 | 38 | 18 | 18.5 | 5 | 5.1 |
| Comm. Law | 174 | 40 | 22.9 | 37 | 21 | 11 | 6 |
| Soc. Science | 180 | 28 | 15.5 | 36 | 20 | 12 | 6.7 |
| Music | 163 | 25 | 15.3 | 28 | 17.7 | 78 | 48 |
| Typing | 105 | 25 | 23.8 | 24 | 22.1 | 11 | 2 |
| Estim. & Contr. | 2 | 2 | 100 | | | | |
| Welding | 1 | 1 | 100 | | | | |
| Shop Mangt. | 1 | 1 | 100 | | | | |

*Table IV. Estimated value of subjects as reported by 305 graduates*

| What should be the aims of the trade schools? | Frequency |
|---|---|
| 1. Give a thorough training | 115 |
| 2. Give more practical training | 55 |
| 3. Placement and followup | 37 |
| 4. Teach efficiency | 18 |
| 5. Teach labor problems and conditions | 9 |
| 6. Comparative training | 8 |
| 7. Give general training in all trades | 7 |
| 8. Encourage students to specialize | 5 |
| 9. Enlarge the school plant | 6 |
| 10. Guidance | 5 |
| 11. Train skilled workers | 5 |
| 12. Teach students to establish and manage business | 5 |
| 13. Encourage originality and initiative | 5 |
| 14. Teach citizenship | 4 |
| 15. Teach social habits and character education | 3 |
| 16. Teach latest industrial methods | 3 |
| 17. Demand higher workmanship | 4 |

| How can the trade school further help its graduates | Frequency |
|---|---|
| Correlate school and outside methods | 18 |
| Keep in touch with industries | 15 |
| Placement and followup | 15 |
| Cooperative training | 14 |
| Use very competent instructors | 10 |
| Provide for new occupations | 5 |
| Coordination | 5 |
| Offer advanced courses | 2 |

| What can the trade schools do to produce more efficient craftsmen | Frequency |
|---|---|
| Give more practical work | 44 |
| Give more time to shop practice | 28 |
| Teach speed and accuracy | 20 |
| Teach social habits | 18 |
| Use modern equipment | 17 |
| Make school shop more life-like | 10 |
| Use well-trained teachers | 9 |
| Offer advanced training | 8 |
| Encourage students to join unions | 8 |
| Give more related subjects | 8 |
| Make trade education wide and general | 5 |
| Visit industries | 5 |
| Add some cultural aspects to trade courses | 5 |
| Give small pay to students on practice jobs | 4 |
| Teach and foster labor legislation | 4 |
| Use latest texts | 3 |
| Stress scholastic achievement | 3 |
| Seek to equalize economic opportunities | 3 |
| Teach in regard to building codes | 3 |
| Frankly tell students of limited opportunities | 2 |
| Synchronize trade education with practice | 2 |
| Do research to keep pace with industries | 2 |
| Select students with high I.Q. | 3 |
| Better organized trade courses | 2 |
| Cooperative training | 3 |
| Guidance--into new vocation | 1 |
| Acceptance of a new philosophy of industrial education | 1 |

*Table V. Answers received from trade graduates*

schools should set up and maintain a vocational service bureau which would make contact with industry and with labor unions so as to know existing conditions in the various industries. At the same time, the bureau should know what kinds of jobs are available, the demands for them, and the opportunities they offer. The bureau should also seek to cooperate with the state employment service."

The data seems to reveal that several subjects, according to the graduates, are thought to be of little real value to the tradesmen. It may be observed from Table IV that 98 per cent of the graduates feel that the subject of English is of the most value to them; 99 per cent feel that shop practice is of a great deal of value to them; while 48 per cent of the graduates feel that music is of no real value to them.

The graduates were asked to give expressions on three topics. There was a wide variation in the answers received. However, the answers were sifted and condensed as shown in Table V.

It may be seen from Table VI that radio and air conditioning are subjects that the graduates feel the schools should include in their trade courses.

## General Conclusions

In the light of the findings it would seem proper to make an appraisal of the trade-training programs of these schools, and because of the facts presented, certain general conclusions seem justified:

1. Apparently there is a need for a new type of service that will make close ties between the schools and industry. An "Industrial Contact" man, Co-ordinator, "School-Industry Relation" man, or whatever the title might be, could perform a distinct service that is in demand and which would make more effective our trade-training programs.

2. The schools seem to be turning out a number of graduates who are inefficient. It would seem wise to conclude that the training programs need to be reorganized and intensified so as to make certain that the graduates are thoroughly trained. For a graduate who lacks a thorough training is greatly handicapped from the start.

3. There is a strong demand for training on real practical (outside) jobs, and less use of the exercise method of shop instruction.

4. It seems desirable that whenever possible the schools should use the cooperative plan of trade training. It is also advocated that the schools should seek to provide learning through direct participation in industrial production work. This seems to be a necessary condition for real vocational efficiency. Mathewson[1] has outlined the purposes of such a plan:

"One purpose of the Cooperative plan is to teach a student to get along with his fellow workers (and employers). Another purpose is to enable him to learn the ways of industries and the means of progressing in it. He must make good with his employer. Even more important, a student should be discovering how to live a practical life and an honest one."

5. As a result of interviews with 120 graduates, as well as the expressions through the questionnaires, it is desirable that the schools make studies of and keep in close touch with occupation opportunities. This might be done through the school's placement departments. Labor problems should be studied by the schools, and taught to the students. This would bridge the gap between the school and the job. The graduates would know what to expect from industry and not be disillusioned with the belief that "the world is waiting for his sunrise."

6. The difficulties as reported by the graduates seem to indicate that personality factors must be considered, as well as knowledge and skills, if better citizens are to be developed.

7. It seems that the offerings provided by the schools should depend on the needs of the community. And this seems to suggest the need of a local survey of vocational opportunities.

8. In many instances, it seemed that the schools were training students for industries that cannot absorb them. Such a training program represents a great loss and waste of life and property.

9. It seemed that there were no trade graduates listed on work relief and direct relief.

10. It would be well for the trade schools to know what will be most needed in the form of job qualifications. For this reason the school industry and other social agencies should work closely together in order that the problem of giving the best vocational education to the student be most effectively solved.

[1]Stanley B. Mathewson, *Restriction of Output Among Unorganized Workers* (New York: The Viking Press, 1931), p. 1.

| Major difficulties | Frequency |
|---|---|
| 1. Racial discrimination | 41 |
| 2. Lack of experience | 39 |
| 3. Lack of thorough training | 38 |
| 4. Lack of speed and accuracy | 21 |
| 5. Inability to estimate or set price | 15 |
| 6. Scarcity of jobs--general unemployment | 13 |
| 7. Trade unions | 10 |
| 8. Attitude of "seasoned" workers | 8 |
| 9. Obtaining license | 7 |
| 10. Getting adjusted | 7 |
| 11. Lack of tools and supplies | 5 |
| 12. Inability to do some technical operations | 5 |
| 13. Competition with untrained workers and mass production | 3 |
| 14. Attitude of executives | 3 |
| 15. Pleasing the public | 3 |
| 16. Lack training to manage own small business | 2 |
| 17. None | 31 |
| 18. Non-committal | 51 |

*Table VII. Difficulties encountered in their trades by 305 graduates*

| Training that schools did not offer for which they now feel a need | Frequency |
|---|---|
| 1. Radio principles | 29 |
| 2. Heating and air-conditioning | 23 |
| 3. Business management | 26 |
| 4. Estimating and contracting | 21 |
| 5. Ludow | 14 |
| 6. Salesmanship | 14 |
| 7. Shop management | 13 |
| 8. Refrigeration | 13 |
| 9. Dry cleaning | 12 |
| 10. Body and fender work | 12 |
| 11. 4 in. joint wiping | 12 |
| 12. Welding | 4 |
| 13. Interior decorating | 4 |
| 14. General knowledge of all trades | 3 |
| 15. Elements of journalism | 3 |
| 16. Refinishing and restoration | 3 |
| 17. Power plant operation and maintenance | 2 |
| 18. Linotype | 2 |
| 19. Sterotype | 2 |
| 20. Ladies tailoring | 2 |
| 21. Machine design | 1 |
| 22. Mental hygiene | 1 |
| 23. None | 3 |
| 24. Non-committal | 5 |

| New occupational training that the schools should provide | Frequency |
|---|---|
| 1. Radio service | 34 |
| 2. Air-conditioning | 29 |
| 3. Aircraft mechanic | 20 |
| 4. Welding | 21 |
| 5. Dry cleaning | 16 |
| 6. Refrigeration | 16 |
| 7. Barbering | 15 |
| 8. How to estimate prices on jobs | 15 |
| 9. Body and fender work | 14 |
| 10. Diesel engines | 13 |
| 11. Building maintenance | 12 |
| 12. Oil burners | 9 |
| 13. Photography | 8 |
| 14. Interior decoration | 5 |
| 15. Auto painting | 4 |
| 16. Tile work | 4 |
| 17. Marine pipefitting | 3 |
| 18. Commercial subjects | 2 |
| 19. Domestic service | 2 |
| 20. Plumbing | 2 |
| 21. Painting | 1 |
| 22. Guidance | 1 |

| Schools should discontinue | Frequency |
|---|---|
| 1. Music | 28 |
| 2. Physics | 22 |
| 3. Algebra | 15 |
| 4. Geometry | 12 |
| 5. Spelling | 10 |
| 6. Four years in some trades | 8 |
| 7. Incompetent teachers | 8 |
| 8. Some academic subjects | 5 |
| 9. So much theory | 3 |
| 10. Physical education | 3 |
| 11. Chemistry | 2 |
| 12. None | 20 |
| 13. Non-committal | 97 |

*Table VI. Provisions for trade schools as reported by 305 graduates*

# The Hope of a Nation


## Dean M. Schweickhard

*Assistant Superintendent of Schools, Minneapolis, Minnesota*


### The Dual Quest of Man

Common observation frequently leads to the belief that the increasing complexity of life is ever creating new quests for men to pursue, and pitting each man against his neighbor in increasing intensity. It cannot be denied that in many fields the trend of human activity is toward specialization, but this only serves to limit the scope of what man may do, and does not alter the nature of his fundamental quests. These have always been simple, and will continue to be so, if he will but keep them in their rightful relationship.

Because of the variety of ways in which human ambitions may be applied it is difficult to perceive the quest in its simple form and distinguish the path followed from the purpose sought. Instilled deep in the being of every normal person there is the fundamental urge for the gratification of one's own impulses, desires, and ambitions. The kind of activity or accomplishment from which a given individual gains satisfaction determines the direction of this first basic quest in his own case. It may vary all the way from shortsighted gratification of animal desires to the self-abnegation of the foreign missionary, or from the tight-fisted motives of the miser to the generosity of the philanthropist. It may be noted in the physical work of the shop, the scientific experimentation of the laboratory, the production and sale of commodities, and numerous other fields of human endeavor, in school and out.

Be it said to the credit of man that he is not fully satisfied through the fulfillment of this quest which has its end in himself or his own generation. A secondary quest, closely allied to the first, and in some cases even appearing to supersede it, is that of seeking to serve the needs of the oncoming generation. It is the pursuit of this quest which has prompted parents through the ages to endure hardship and privation for the welfare of their children, and in the modern era has led to the establishment of schools and colleges with facilities as adequate as available resources will permit. With the annual observance of *American Education Week* we are reminded that this part of man's dual quest cannot be neglected if the enduring purposes of life are to be accomplished.

### Temporary versus Lasting Values

The well-known fable of the ant and the grasshopper, written before the present decade, and even antedating the twentieth century, bears a very conspicuous note of distinction between using one's energy in the pursuit of transitory things and the more farsighted preparation for a program of longer duration. The lesson is equally applicable to the individual and to the nation, for the hope of either is dependent upon, and closely related to, the ability to discriminate between temporary and lasting values.

A common mistake, in work or play, in shop or office, in school and out, on land and sea, at home and abroad, is to look for results which are too immediate. Some things can be hastened and others cannot. Even the span of life is far too short a time in which to witness the beginning and ending of a nation's endurance. A single generation may show a decided trend upward or downward, depending upon the wisdom or shortsightedness exercised at the particular time, but permanent progress can be made only by adding the wisdom and knowledge of one generation to that of the next.

Too often there appears the inclination to emulate the boy Epaminondas in the popular tendency toward indiscriminate hurry. Just because the speed of some things has been increased we are too likely to conclude that everything must be sped up. To put the finish on a piano or an automobile more quickly than could be done by more antiquated methods marks an advance in scientific and industrial practice; but to hasten the process of hatching a chicken by running the incubator at a slightly higher temperature, undermines the subsequent life and growth. In the fields of science and industry there lie greater possibilities for substantial human progress than there are in the hands of economists if they fail to take account of these fundamental distinctions.

### Reason the Basis of Sound Hope

If we live in the temperate zone, where winters are cold and summers are warm, it is useless to spend the summer hoping the winter will not be cold. It is much more within reason to hope that the preparations we make for fuel, shelter, food, and clothing will enable us to withstand the rigorous demands of the colder season. Similarly it is futile for anyone to hope that his own life may be perpetuated endlessly, or to seek the fountain of eternal youth, as did some of the men of old.

It is within the realm of reason, however, to hope that worth-while human accomplishments may be perpetuated from father to son, or from teacher to pupil, in an endless chain, so long as their purposes continue undefiled. Parents and teachers need occasionally to have their powers of *reason* refreshed and strengthened by observing what really commands the interests of youth, rather than to consume time attempting to reason out fine-sounding theories as to what ought to interest them.

Contrary to widespread belief, the real interests of youth are not in superficial pastimes and light amusements, but in the rarer accomplishments of man's courage, intelligence, and skill. Because the material representation of these accomplishments is more readily discernible, youth are lured by the advances in electricity, aviation, exploration, architecture, transportation, and surgery. When adequate account is taken of these interests, as it is in the field of industrial arts, they can be so utilized in educational planning as to guarantee the realization of sound hopes in the years ahead.

*The proper preparation of its youth, not the amassing of wealth and power, ought to be the first concern of every nation.*

### Perpetual Preparedness

There is no thought that the permanent hope of any nation lies alone in the mastery of material things. Quite to the contrary, conspicuous in history has been the downfall of one nation after another which put too great emphasis upon the multiplication of material possessions and machines of warfare to protect them. The chief difficulty in most of such disastrous cases has been that the materialists and the idealists have allowed themselves to be too widely separated from each other, and the result has been the destruction of both.

Industrial-arts teachers and industrialists may take just pride in the material advances thus far made, but they may well stop to consider the lessons of life that may be gleaned therefrom. Likewise, the academic teacher, the philosopher, and the preacher each may have his outlook enlightened and his knowledge enriched by observation and association with the man who works in wood, metal, or other tangible material. The blending of the two in education will produce stronger, saner men and women.

Such a fusion of interests, from the personal and social standpoint, will herald the dawn of hope for fuller returns upon the investment being made annually in education. We can build little hope on philosophy alone, nor on rapid increase of population, nor vast estates, nor powerful machines, but rather on the growth of a people who comprehend the importance of each of these elements in its relationship to the others. The only sound hope for the perpetuation of this or any nation lies in the rising of successive generations of boys and girls, who in their time can assume the responsibilities of wisely directed and well-balanced self-government.

# INDUSTRIAL ARTS and VOCATIONAL EDUCATION

J. J. Metz, Editor

## The 1939 AVA Convention

Grand Rapids will soon be the host to the American Vocational Association, and all teachers of industrial arts and vocational education ought to put forth a special effort to make this annual convention a real success. The industrial-arts men can rest assured that everything will be done by Dr. Homer J. Smith to arrange the Industrial-Arts sessions so that they will be both interesting and helpful. Elsewhere in this issue, Dr. Smith presents a résumé of the excellent programs which Professor Selvidge, the former vice-president of the American Vocational Association representing Industrial Arts, had offered annually at the AVA Conventions since 1927.

As shown in Dr. Smith's article, the list of subjects covered at these various meetings is truly astounding. The long enumeration of the titles of addresses shows how well the various phases of our work have been covered. The table containing the names of the speakers who have appeared on the AVA industrial-arts programs at the various conventions resembles a Who's Who in industrial-arts work.

Every industrial-arts instructor may well be proud of the service which this section of the American Vocational Association has rendered. For this reason, everyone interested in industrial arts should without fail attend this year's AVA convention. It is but right that the efforts of our leader, Homer J. Smith, be not passively recognized but also supported by active participation.

The industrial-arts sectional meetings were well attended in the past. It is hoped that the 1939 convention will set a new high that will show how deeply industrial-arts teachers are interested in improving themselves and how seriously they are intent to better their offerings in the particular sphere of general education for which they stand.

## The Colonial Printing Press

Print-shop teachers and students of printing, the country over, would have been interested, no doubt, in the exhibit which was held at Grand Central Palace in New York City during the week of October 1 to 7 in commemoration of the 300th anniversary of printing in Colonial America.

Among the exhibits was a wood, screw-type printing press upon which Stephen Daye is said to have produced the first piece of printing in the United States. He had set up his press in Cambridge, Mass., in 1639.

This pioneer printer, could he return, would be astounded at the rapidity with which the printed word is now reproduced on the modern presses. He would have difficulty to even guess at the uses of some of the complicated machines which are at the command of the printer of today. Were he to observe one of our present-day printers plying his trade, he, no doubt, would be puzzled that so many operations at which the old-time printer had to possess skill and dexterity are no longer in use.

We, on the other hand, might stand by and thoughtlessly look down upon this man who produced his work so slowly and laboriously. It is so easy to forget that practically all progress is made by starting with the simple, and frequently the obvious, and then adding one detail after another until a gigantic, complicated, accurate machine, such as we now see in printing plants, has been produced. This is just what has happened in the printing industry and our achievements were made possible only because of the rugged enterprises of such pioneers like Daye, who opened up new paths for us to explore.

## War, War, War

The unfortunate affairs in Europe which again threaten to embroil the entire world in another catastrophic, if senseless, war, will affect the United States, even if this country manages to stay out of the struggle. Plans are even now being perfected to synchronize the efforts of the government and of business and industry in the face of any eventuality.

Many manufacturers are already working on war orders, some to bring our own war equipment up to emergency levels, others on similar assignments that have come from foreign countries. The industrial activity thus started may shortly bring the American public to a realization that it has been following an exceedingly shortsighted policy during the past eight or nine years when so many cities so drastically cut their educational budgets, that their offerings in industrial arts and vocational education were either nonexistent or just weak gestures.

As our industries are being swept farther and farther into the highly geared up production of all that goes with the frantic efforts of producing huge quantities of war materials, they will appreciate what it means not to have available a source from which to obtain skilled labor as it is needed. They will also find out that it costs huge sums of money to change men, unskilled in any art, into skilled workers in a minimum space of time.

It is true, during the early years of the World War, thousands of unskilled men were taken into ammunition plants and trained to do specific jobs on lathes, milling machines, grinders, or on other production machines. This can, and, no doubt will be done again. But the tool setting on the machines and the supervision of the unskilled workers on these machines was in the hands of well-trained, all-round mechanics.

Not having trained a sufficient number of these skilled men in the past years will now be seriously felt. Probably deduction will lead the employers in business and industry to deplore the penny-wise and pound-foolish decisions to so pare down educational budgets that industrial arts and vocational education could barely exist. Most likely, however, these so-called leaders will merely blame the school for its failure to train students for skilled operations and use this as another example to show how the school has failed to train for life.

Be that as it may, those in charge of industrial arts and vocational education had better start thinking through their problems carefully. The near future may throw serious tasks into their laps without giving them time to do much planning. There is an opportunity now, however, to take the necessary steps to interest local industrial, labor, and civic groups in laying preliminary plans for giving the needed training, should the emergency arise, to that large group of potential workers who have been left without adequate trade preparation and without job experience, by the depression which has, as yet, not left us.

# Education for the Machine Age


## E. C. Wittick

*The University High School,*
*The University of Chicago*
*Chicago, Illinois*


We hear everywhere from speakers, we read in newspapers, magazines, and books that this is a machine age, or an age of *power,* and that we live in an industrial society. Yet, how much do we, as teachers, know about it? And what are we doing about it in our schools? What are we doing to make our pupils understand about the machines, and particularly about the power that makes these machines possible — the power that makes our lives comfortable, that does our work, that gives us efficient, comfortable transportation on water, on land, and in the air; and that, on the other hand, creates new social and economic problems at the same time?

We have wind power, water power, steam power, internal-combustion-engine power, and electrical power. In addition to these, we have the multitude of devices that are used in transmitting and applying power. *The development of these powers has had a profound effect on the advancement of civilization, and continues to exert tremendous influence.* Yet, there is no provision made for the study of them in our schools. Any knowledge of power possessed by the layman is usually gained incidentally. Our present industrial-arts, science, and social-science courses taken together and properly integrated could do much to meet the need indicated here, but they do not. What is needed is a course on the study of power involving aspects of all three of the aforementioned courses.

So, again the question is asked, What do we, as teachers, know about it? What do we know about power and its effects on our lives? How much better off would we be if we did know more about it? How much better off would our future citizens be if they knew more about it? Better yet, how much better off will our pupils be in their present everyday lives?

These questions might be answered by asking more questions. Take wind power for an example: All of us have seen the American type of windmill throughout our lives. Very few of us have seen Dutch windmills. Very few of us ever get near enough to any kind of windmill to actually learn how it works, or what makes its wheels go around. Yet to be considered really cognizant of what is going on in the world, should we not know a little about these machines that do so much of our useful work? For instance: How is power developed from wind? How long have windmills been in use? How many different kinds of windmills are there in use? Why is it necessary to have different kinds of windmills? How much does wind power cost in comparison to other kinds of power? What about the generation of electricity by wind power — how is it accomplished? — is it economical? What is in the little box on top of the windmill tower? How does one start and stop a windmill? What prevents a windmill from running too fast when the wind becomes too strong? What effect has the development of wind power had on the advancement of civilization? These are just a few of the questions that one should be able to answer in order to be considered generally intelligent about wind power. Similar questions might be asked about any kind of power. Would we not feel more at home in this modern mechanized world if we could answer questions such as these for any kind of power such as water power, steam power, internal-combustion power, and electrical power?

When we read, we encounter such phrases as, "The acrid smell of the Diesel exhaust, the rhythmic motion of the crossheads, or, the hum of the turbines." Or we may see sentences like the following: "Francis turbines will be installed in the new water power plant," or "the city council has decided to replace the old Corliss pumping engines with modern high-pressure turbines." We also encounter words like fuel injector, water-tube boiler, boiler feed pump, Corliss valves, uniflow engines, forebay, penstock, tail race, single-phase motor, three-phase motor, and so on. This is the language of the Machine Age. What do these words and phrases mean to you? How much do they mean to your pupils? Perhaps you and your pupils have been sliding over these words in the latest best seller, in the *Saturday Evening Post,* in *The Atlantic Monthly,* or in the daily newspaper.

Why not do something about this situation? Why not let a pupil run a Diesel, and smell the exhaust smoke? Why not let him take that same Diesel apart and see what is inside; examine the fuel injector, pistons, piston rods, crankshaft, and all the other parts? Why not let him take a steam engine apart and see what is inside, clean and adjust the crosshead, adjust the valve and valve gear? Let him take a gasoline engine apart, examine its insides, put it back together, run, and adjust it. Why not at least show him a cross-section drawing, or better still, a motion picture of a water-power plant where the forebay, penstock, turbines, draft tube, and tail race are illustrated? Films are available that illustrate the principles of operation of power machines and correlate the study of power with science and the social sciences. Why not let the student take a steam turbine apart, see what is inside, then put it together, run it, and listen to its hum? Then let him learn something of the history of these machines and their effect on the rise of civilization. All these things are possible.

Would we not all be more intelligent readers, conversationalists, citizens, if we had had opportunity to study power machines in this manner? Would you not consider yourself more fully "generally educated"? Would you not feel more at home in this modern mechanized world? As a teacher, if your pupils were given opportunity to learn these things, would you not feel that they were better prepared to meet everyday life and to be better citizens?

So, why not do something about giving your pupils an opportunity to learn about the machine age in which they live, and base that opportunity on the study of the power that makes that machine age possible? Something is being done about it at The University High School of The University of Chicago. A course called "Power Laboratory," for want of a better name, has been in the process of development there for the past twelve years and has now reached the stage at which it should be brought to the attention of the general public and the teaching profession.

The power laboratory course, as one of the newer types of industrial-arts courses now in use at The University High School, illustrates an attempt to answer the questions that have been put, and to really do something about education for the Machine Age. This course was designed for, and is being given to, 10th-grade pupils. An elementary course is also being given in the eighth grade. The aim of the course is to acquaint pupils with the modern mechanized world in which they live through a study of the power machinery that makes that world possible. Its content is such that it will enrich any industrial-arts, academic, or vocational curriculum. It may be described as an orientation course in that it gives the pupil an opportunity to learn his relationship to power, its effect on him, and its effect on civilization in general.

The general and specific values of the course may best be understood by referring to the chart shown in Figure 1. This chart shows how a knowledge of the five types of power are useful in everyday life, recreations and vocations, and gives the specific instances in which this knowledge is useful. The chart has not been expanded to its full extent; it is given here merely as an indication of the possible values of the course.

### The Content of the Power Laboratory Course

How the aims and purposes of the power laboratory course are realized may best be brought out by describing what has been done at The University High School. What we have done may not be the correct thing; certainly there are other ways of

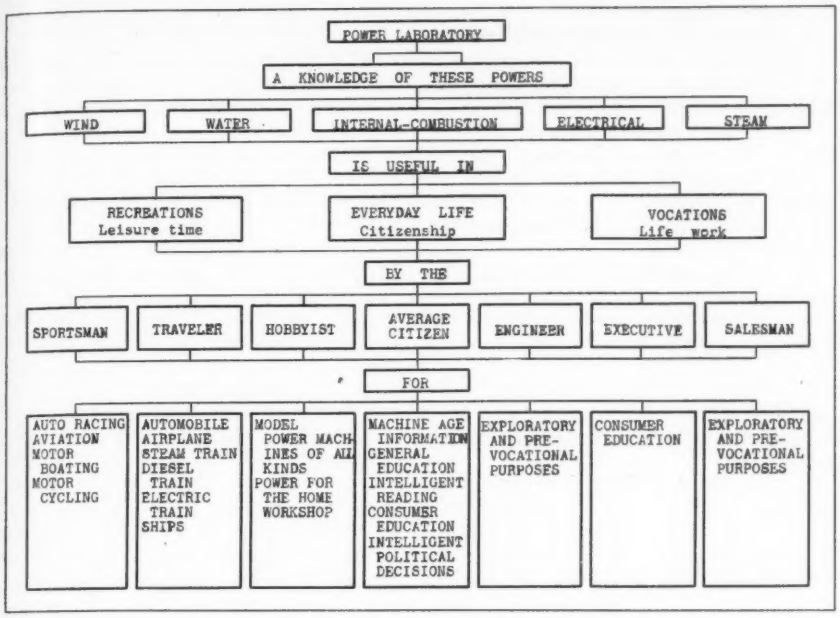


*Fig. 1. The values of the power laboratory course*

teaching pupils about power machines, and perhaps better ways. Our course content and methods are set forth here for your consideration and criticism. Suggestions as to changes in content and method will be welcomed and taken under consideration.

The content of our course, or the field covered by the instruction, may be seen by referring to the chart shown in Figure 2. This chart is not in full detail; it merely shows the main divisions of the subject and the basic types of machines studied. It does not indicate the attention given to correlation with other subjects.

The course is organized on the unit basis under the following heading:

I. WIND POWER
1. Wind-tunnel experiments. (Low-speed and high-speed machines.)
2. Wind electric generators.

II. WATER POWER
3. Impulse wheel experiments. (Study of all types of machines.)

III. STEAM POWER
4. The reciprocating steam engine.
5. The steam turbine.

IV. INTERNAL-COMBUSTION POWER
6. The two-cycle engine.
7. The four-cycle engine.
8. The automobile engine.
9. The aircraft engine.
10. The Diesel engine.

V. ELECTRICAL POWER (As a means of power transmission.)
11. The A.C. generator.
12. The A.C. motor.
13. Transformers.
14. The D.C. generator.
15. The D.C. motor.

VI. POWER TRANSMISSION
16. Simple machines.
17. Mechanical transmissions.
18. Hydraulic transmissions.
19. Pneumatic transmissions.

VII. MISCELLANEOUS
20. Power measuring (horsepower testing).
21. Storage batteries.

## Methods of Teaching

Teaching in these units is carried on by the supervised-study, individual-instruction method. Unit-study guide sheets have been written for the course and are found very useful in this connection. These merely give general directions for proceeding with the work, directions for reference reading, and assignments for written work. In the supervised study and individual instruction the small group lecture demonstration is used extensively. Every effort is made to develop independent thinking on the part of the pupil.

In studying the various power machines the pupil is required to: (1) Study the basic principles of operation of the machine, its care, uses, something of its history, the problems met in its invention and development, and its effect on civilization and present-day life. (2) Take a representative machine apart, examine all parts carefully, make minor repairs if necessary, reassemble, operate, and learn to control speed and power. (3) Answer a number of questions based on reference reading and on experience gained in actual contact with the machine. In general, this procedure is carried out for each unit of the course.

In addition to the regular unit-study guide sheets, a number of operation sheets have been developed for use in aiding instruction. These include such titles as:

1. How to take any machine apart.
2. How to repack a stuffing box on a small steam engine.
3. Making gaskets.
4. Grinding valves.
5. Timing valves.

## Equipment

Equipment for this course, as we have set it up, is not expensive; much of it is obtained free from manufacturers, and other machines are bought from used-machinery dealers or picked up in junkyards. Much good experience may be had by pupils in cleaning, repairing, and installing machines. Most of our equipment has been rebuilt and installed by the pupils. We have endeavored to obtain at least one representative machine for each type of power studied. The following is a list of our equipment. This list necessarily will undergo constant change.

*For Wind Power*

1. Small wind tunnel for testing and observing models of different types of windmills (partly made by pupils).
2. Six-volt wind charger.

*For Water Power*

3. Water tank 2½ ft. deep, 2 ft. wide, 6 ft. long, with supply pipe and drain (stock water tank).

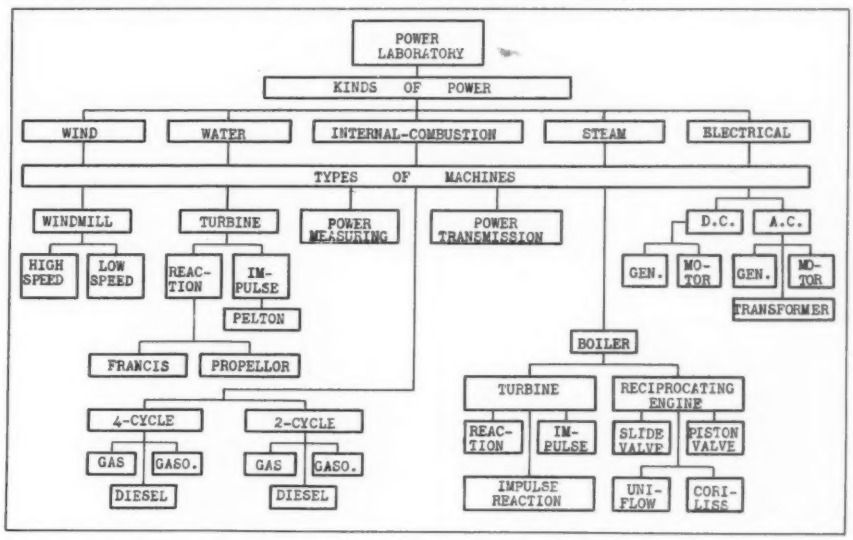


*Fig. 2*

4. Pelton wheel, 12-in. diameter (designed and made by pupils).

*For Steam Power*

5. D-slide valve engine, 2 h.p.
6. Piston valve engine, 2 h.p.
7. Pyle-National 10-h.p. turbine (velocity staged, impulse type).
8. Steam pressure, 80 lb. from heating mains (we should have a boiler).

*For Internal-Combustion Power*

9. Several single-cylinder, two- and four-cycle engines (obtained from local lawn-mower agency) (used engines).
10. Johnson LT37 outboard engine (runs in water-power tank).
11. Four-cylinder Model A Ford engine in chassis.
12. Six-cylinder overhead valve engine.
13. V-8 engine.
14. Radial aircraft engine (old Anzani in running order).
15. Witte Diesel engine (three h.p. vertical).
16. Six storage batteries.
17. Tube-type battery charger (three-battery capacity).

*For Electrical Power*

18. Several D.C. generators and motors (all sizes from 1 to 12 h.p.).
19. Switchboard for interconnecting generators and motors.
20. A.C.-D.C. motor-generator set (220 volts). D.C. generators in other cases in our shop are directly connected to gasoline engines, belt driven from steam engines, and chain driven from the steam turbine.

*For Power Transmission*

21. Air-compressor unit (assembled by pupils).
22. Various other devices are represented in connection with other equipment in the shop.

*Miscellaneous*

23. Wrenches, gauges, meters, and tools of all kinds necessary in testing, adjusting, and repairing.
24. The school machine-shop equipment. This may be considered as a part of the power-laboratory equipment as it is used extensively in the study of power applications as well as in repair and installation.

## Conclusion

What has been set forth here describes one of the problems of modern education, and how that problem has been met in one school. The course described may be called a combination of industrial-arts work, science, and social science with emphasis on the industrial-arts side. With a good teacher, the objectives set forth by the Committee on Standards of Attainment in Industrial-Arts Teaching may be readily realized through this course. There are at present, no means of objectively testing whether or not the problem is being successfully solved, but the opinions of prominent educators who have visited our power laboratory, the reports of former pupils, and the unsolicited comments of parents have all been very encouraging. What is needed now is further trial of power-laboratory courses in other schools throughout the country, research, and collaboration by teachers in comparing results, and improving content and methods.

# Magazines in the School Shop

## Bernard C. Hagen

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The survey described herewith was conducted in order to determine which magazines were most frequently used in the school shop. To get this information, a selected list of industrial-arts teachers from fourteen different states were asked the questions, "To what shop magazines do you subscribe, and what magazines are made available to you by your school?" The states represented were: Michigan, Illinois, Iowa, Wisconsin, Ohio, Missouri, Kentucky, Minnesota, South Dakota, North Dakota, Montana, Kansas, Arizona, and Texas.

Figures 1 and 2 show the results of the first survey made in 1934; Figures 3, 4, and 5, the second survey made in 1936; and Figures 6, 7, and 8, the third survey made in 1937. In 1934 it was determined that the nine magazines most frequently used constituted 84 per cent of the total subscribed to. The magazines leading the list were the two professional magazines in the field of industrial education. The other 16 per cent of the magazines were more technical in nature and more suited for unit shops.

In the 1936 survey it was found that the INDUSTRIAL ARTS AND VOCATIONAL EDUCATION magazine again headed the list. The group surveyed at this time was much smaller; the reason being that the second-term students were used while in 1934 the first-term students had been used. It is quite evident that the trend toward home-workshop magazines, is growing stronger. The *Home Craft* magazine was highly recommended, being surpassed only by the INDUSTRIAL ARTS AND VOCATIONAL EDUCATION magazine. The *Home Craftsman* magazine was also recommended very strongly.

In the 1937 survey the INDUSTRIAL ARTS AND VOCATIONAL EDUCATION magazine stepped into first place in all three divisions. It was subscribed to by the teachers

MAGAZINES SUBSCRIBED TO BY THE TEACHERS

1934

| | |
|---|---|
| INDUSTRIAL ARTS AND VOCATIONAL EDUCATION | 29 |
| Industrial Education | 21 |
| Popular Science | 12 |
| Popular Mechanics | 11 |
| Home Craftsman | 9 |
| Popular Homecraft | 9 |
| American Builder | 7 |
| Home Craft | 6 |
| Pencil Points | 3 |
| Automotive Journal | 2 |
| Inland Printer | 2 |
| Machinery | 2 |
| Scouting | 2 |
| American Home | 1 |
| Architecture | 1 |
| Automobile Digest | 1 |
| Architectural Forum | 1 |
| American Machinists | 1 |
| Better Homes and Gardens | 1 |
| Builders Guide | 1 |
| Iron Age | 1 |
| Machinists Monthly | 1 |
| Model Craftsman | 1 |
| Occupations | 1 |

*Fig. 1*

MAGAZINES RECOMMENDED FOR SCHOOL SHOP

1934

| | |
|---|---|
| Home Craft | 3 |
| Home Craftsman | 3 |
| Industrial Education | 3 |
| Popular Mechanics | 3 |
| Popular Science | 3 |
| Pencil Points | 2 |
| Popular Homecraft | 2 |
| Aviation | 1 |
| Boys Life | 1 |
| Furniture Mfg. and Artisan | 1 |
| Hobbies | 1 |
| INDUSTRIAL ARTS AND VOCATIONAL EDUCATION | 1 |
| Inland Printer | 1 |
| Motor Maintenance | 1 |

*Fig. 2*

MAGAZINES SUBSCRIBED TO BY THE SCHOOLS

1936

| | |
|---|---|
| Popular Mechanics | 12 |
| INDUSTRIAL ARTS AND VOCATIONAL EDUCATION | 11 |
| Popular Science | 9 |
| Industrial Education | 6 |
| Home Craft | 3 |
| Scientific American | 2 |
| American Boy | 1 |
| American Builder | 1 |
| American Photography | 1 |
| Home Craftsman | 1 |
| Home Mechanics | 1 |
| Home Workshop | 1 |
| Modern Mechanix | 1 |
| Popular Aviation | 1 |
| Scientific Monthly | 1 |
| Science Weekly | 1 |
| Vocational Education | 1 |

*Fig. 3*

MAGAZINES SUBSCRIBED TO BY THE TEACHERS

1936

| | |
|---|---|
| INDUSTRIAL ARTS AND VOCATIONAL EDUCATION | 17 |
| Popular Science | 8 |
| Home Craft | 5 |
| Popular Mechanics | 5 |
| Industrial Education | 4 |
| Popular Homecraft | 4 |
| American Home | 1 |
| Better Homes and Gardens | 1 |
| Builder | 1 |
| Education | 1 |
| Model Craftsman | 1 |
| Modern Mechanix | 1 |

*Fig. 4*

MAGAZINES RECOMMENDED FOR SCHOOL SHOP

1936

| | |
|---|---|
| INDUSTRIAL ARTS AND VOCATIONAL EDUCATION | 13 |
| Home Craft | 12 |
| Popular Mechanics | 12 |
| Popular Science | 12 |
| Industrial Education | 6 |
| Home Craftsman | 3 |
| Popular Homecraft | 3 |
| American Boy | 1 |
| Adult Education | 1 |
| American Photography | 1 |
| Child Life | 1 |
| Field and Stream | 1 |
| Hobbies and Craftsman | 1 |
| Home Mechanics | 1 |
| Home Workshop | 1 |
| Home Workshop and Hobbies | 1 |
| Model Aircraft | 1 |
| Model Craftsman | 1 |
| Occupations | 1 |
| Pencil Points | 1 |
| Scientific American | 1 |
| Science Weekly | 1 |
| Vocational Education | 1 |
| Safety Publications | 1 |

*Fig. 5*

MAGAZINES SUBSCRIBED TO BY THE SCHOOLS

1937

| | |
|---|---|
| INDUSTRIAL ARTS AND VOCATIONAL EDUCATION | 26 |
| Popular Mechanics | 23 |
| Popular Science | 21 |
| Popular Homecraft | 14 |
| Industrial Education | 12 |
| Automobile Digest | 3 |
| Deltagram | 3 |
| Home Craftsman | 3 |
| Furniture Mfg. and Artisan | 2 |
| Inland Printer | 2 |
| Modern Mechanix | 2 |
| Scientific American | 2 |
| Architectural Forum | 1 |
| American Machinist | 1 |
| American Photography | 1 |
| Arts - The School Arts | 1 |
| Better Homes and Gardens | 1 |
| Electrical Engineer | 1 |
| Iron Age | 1 |
| National Council of Safety | 1 |
| National Builder | 1 |
| The Homeworkshop | 1 |
| Radio | 1 |
| Vocational Education | 1 |

*Fig. 7*

MAGAZINES RECOMMENDED FOR SCHOOL SHOP

1937

| | |
|---|---|
| INDUSTRIAL ARTS AND VOCATIONAL EDUCATION | 34 |
| Popular Homecraft | 28 |
| Popular Mechanics | 24 |
| Popular Science | 24 |
| Industrial Education | 17 |
| Home Craftsman | 6 |
| Inland Printer | 2 |
| Hobbies | 2 |
| American Builder | 1 |
| American Photography | 1 |
| Architectural Forum | 1 |
| Arts - The School Arts | 1 |
| Automobile Digest | 1 |
| Better Homes and Garden | 1 |
| Deltagram | 1 |
| Electrical Engineer | 1 |
| Furniture Mfg. and Artisan | 1 |
| Model Airplane | 1 |
| Modern Mechanix | 1 |
| National Safety Council | 1 |
| Scientific American | 1 |
| The Model Maker | 1 |
| U. S. Steel Bulletin | 1 |
| Vocational Education | 1 |

*Fig. 8*

personally more than 2 to 1 to its nearest competitor the *Popular Mechanics* magazine. The *Popular Homecraft* magazine shows a decided increase over the previous year. In 1937, the six magazines most frequently subscribed to constitute 90 per cent of the total. The INDUSTRIAL ARTS AND VOCATIONAL EDUCATION, the *Popular Mechanics*, the *Popular Science*, the *Popular Homecraft*, and the *Industrial Education* magazine are the five most frequently subscribed to, both by teachers and by schools. Their subscriptions total 84.7 per cent of all subscriptions in the 1937 survey. This being true we might safely conclude that they are the magazines which are found most commonly in the school shops.

One is unable to tell from the charts how many of the teachers had direct access to the two professional magazines in the field of Industrial Education. In the 1937 survey each teacher responding either subscribed to the INDUSTRIAL ARTS AND VOCATIONAL EDUCATION magazine or the school in which he taught, supplied it to him. The *Industrial Education* magazine, while not ranking as high as the other professional magazines, was subscribed to by schools more often than by the teachers, but the survey showed that 100 per cent of these graduate men had access to the one or to the other of these magazines.

The trend toward home-shop magazines is very significant since it shows that the industrial-arts teacher is looked to for material and guidance in home-workshop organizations and programs. The progressive industrial-arts teacher will give all possible aid to this field of activity which is so closely related to his own work.

What the teacher should look for in magazines: Professional content, applicability of material to his situation, recency of material, new ideas for methods, projects and management, shop kinks — references, desirable composition — readability, interest factor, pupil interest getting, leaders who contribute, illustrations, where to get materials, self inspiration, cost.

What student looks for in magazines: Attractiveness — cover and illustrations, new projects and problems, things he can do at home, new ideas and inventions, readability, cartoons.

MAGAZINES SUBSCRIBED TO BY THE TEACHERS

1937

| | |
|---|---|
| INDUSTRIAL ARTS AND VOCATIONAL EDUCATION | 29 |
| Popular Mechanics | 12 |
| Popular Homecraft | 7 |
| Popular Science | 6 |
| Industrial Education | 5 |
| Home Craftsman | 4 |
| American Photography | 1 |
| Better Homes and Gardens | 1 |
| Home Craft | 1 |
| Modern Mechanix | 1 |
| Motor Magazine | 1 |
| Radio News | 1 |
| Science and Invention | 1 |
| Vocational Education | 1 |

*Fig. 6*

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# Lessons for Young Workers–XIII

## Thomas Diamond


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### How is Capital Accumulated?

The remark is made quite frequently that capital is unnecessary and that, therefore, the capitalist is not entitled to a share in the profits of the company in which his capital is being used. The following story is presented as an illustration of a situation that is quite common in our present-day industrial world.

Suppose we conceive a primitive community of 100 persons living at the foot of a mountain so situated that each person, by working each day to the full limit of his normal time and strength, is able to produce for himself the necessary food, clothing, and shelter for normal existence.

Let us suppose that water can be had only from a spring near the top of the mountain, which is soon lost in internal crevices. Every man is obliged to take his pail once a day and climb up the mountain to the spring and back again in order to get the water necessary for his livelihood, and it takes each of them one hour out of every day to get this water. It occurs to one of these men, imaginative and energetic beyond his fellows, that if he can build a sluice from the spring to his home it will be unnecessary for him to climb the mountain.

He therefore does his regular work in nine hours instead of ten hours, and with the hour saved he is enabled to put in extra time on his sluice. That sluice, of course, is in a sense, stored-up labor.

When it is ready, he makes the connection at the spring, and the water runs into a basin which he has prepared at the foot of the mountain. The man who built the sluice finds that he has not only more water than he can use himself, but in fact sufficient water to enable him to supply all the other members of the community. He therefore proposes to his neighbors: "If you will each give me the product of 15 minutes of your time each day, I will allow you to take water from my basin which is furnished by the sluice which I have built."

This being a primitive community, perhaps the first impulse of his neighbors was to reply: "Go to — the water is here; we'll use it for nothing." And possibly when he

objected they prodded him into silence with a meat ax or some other primitive equivalent.

We will suppose for the sake of the economic parable, however, that they were wise above their primitive fellows and acquiesced his suggestion.

This man would in that case have each day the result of a total of 24¼ hours of labor by his 99 neighbors.

This would, of course, make it unnecessary for him to work any more; he is literally living on his income.

To be sure, through the imagination and energy of their neighbor, the 99 others have acquired perpetually 45 minutes of leisure a day, which they had never known before — yet capitalism had entered primitive society.

Being imaginative and energetic, however, this primitive capitalist of the village at the foot of the mountain was not content to belong to the idle rich.

Having now all of his time at his disposal to think and contrive, and noticing the power of the water coming through his sluice, we will suppose he works out a simple water wheel, and places it in the sluiceway. He finds that considerable power is developed through the water turning the wheel. Supposing the spring to be large enough, he then uses a part of his time in building a larger sluice, and employs the other 99 men for a quarter of an hour a day, taken out of their three quarters of an hour leisure. This still leaves every man with a half hour of leisure time. In the course of a short period the new sluice is ready, a large wheel is properly placed, and a primitive mill is constructed. The man then notifies his neighbors that if they will bring their grain to his mill, he will grind it for them for the equivalent of the use of, say, one hour of their time apiece, where formerly by hand it took each of them two hours.

So industry enters society; our embryo capitalist has become a manufacturer and is becoming richer than ever in labor. True, every other member of the community has now nearly 3 hours of leisure a day where formerly he had none; but this primitive *entrepreneur* then finds it necessary for him to have help in order to grind the grain, and he agrees to give another member of the community the equivalent of an extra hour's work a day, which he pays from the products received for the work of his mill and, working all the time, this man becomes so expert that his employer still has a profit left for himself. The community is thus again benefited, and the 98 men who are left in their regular pursuits have saved a further amount of time each day.

This example could be carried on indefinitely to show the increasingly beneficial results. If the life of such a community were continued over generations, and eventually water power came to be used for generating electricity, with which electric light was produced and electric means of transportation were developed, enabling the members of the community to begin to trade with other communities, insofar as each operation had to do with the progress of the community, it would act in a manner similar to that of the original sluicing.

Yet, if when the inventor first offered to deliver water to his neighbors in exchange for the proceeds of a certain part of their labor, they had said to him, "No, we are ninety and nine and you are only one. To be sure, you have brought the water down the mountain, but we are stronger than you, and we are going to take it," what would have happened? The inventor would have lost the use of his time employed in working out the idea of the water wheel, and he would also probably have lost any incentive for developing further methods for saving time.

There is a lesson contained in this story and the points to be made in it are:

1. In every business there a certain number of tasks to be performed each day.
2. If one person invents a method of performing one of these tasks in one quarter of the time taken formerly he must get some recognition for his ingenuity.
3. If he gets no recognition he will cease his efforts to discover methods of further reducing the time to be spent on the work which must be done.
4. If, through his ingenuity, this individual is enabled to accumulate his rewards, others who are more indolent or who are not so ingenious should not insist that he share those rewards with them.
5. The ingenious villager referred to in the story, accumulated capital in the form of labor and equipment although there was no money in the community.
6. Capital is not necessarily money.

### Questions for Discussion

1. Would the villagers have been justified in taking the water without paying for it?
2. How did they pay for it? Had they any money?
3. What would have happened if they had taken the water without paying for it?
4. Was the man who made the sluice and invented the water wheel entitled to something in return for his industry?
5. If he was, how could he collect it from the villagers?
6. What would you say his capital consisted of?
7. Do you need money to have capital?
8. Suppose the inventor received enough labor from the villagers in return for the use of his capital so that he was freed from doing any work himself, would you say that he was lazy and ought to be compelled to work?
9. What do the villagers get out of the scheme?
10. Can you give any illustrations from present-day industry that could be compared with this illustration?
11. If as a result of great skill in athletics a man accumulates a large number of trophies, would it be just for the losers to insist that he share them with them?
12. Can you see any parallel between Question 11 and modern industry?

# A Thought for Parents

**Oscar Sontag**
**Wayne Judy**
*International Falls, Minnesota*

The following is a letter which the writers sent to the parents of their students in order to give the public a better idea of what the industrial-arts shop is trying to accomplish.

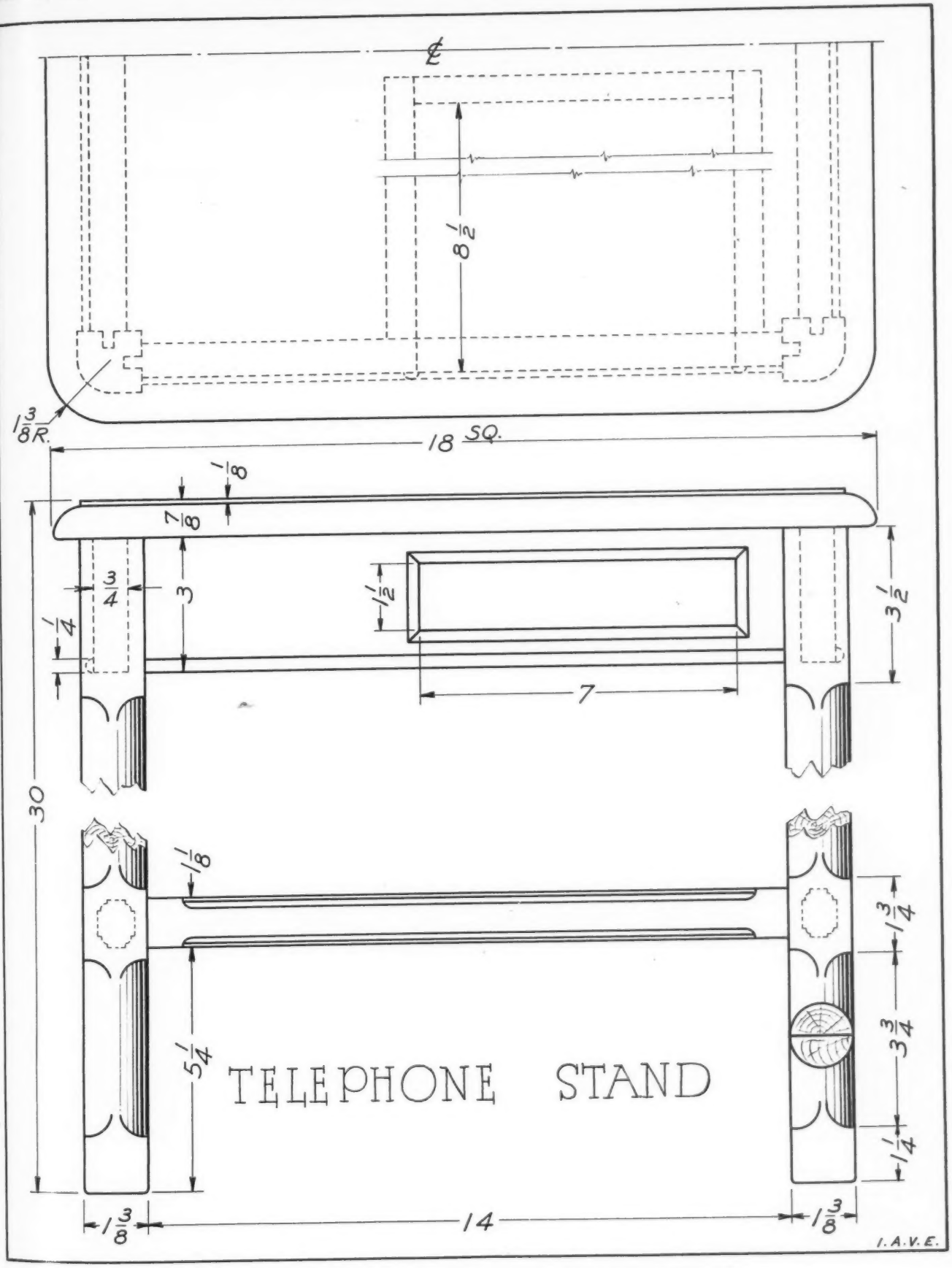
Industrial-arts departments are frequently criticized because projects which the boys bring home could be purchased nearly as cheap at the local stores. This is very often true, but could the things your boy learned through the making of the project be bought at any store, at any price? The school does not intend to compete with large factories and mass production as far as finished products are concerned, but it does want to compete with anyone on the number of learning units it presents to your son through the medium of any given project.

In a school shop it is not so much the question as to what is done to the lumber or metal but rather what is done to your boy.

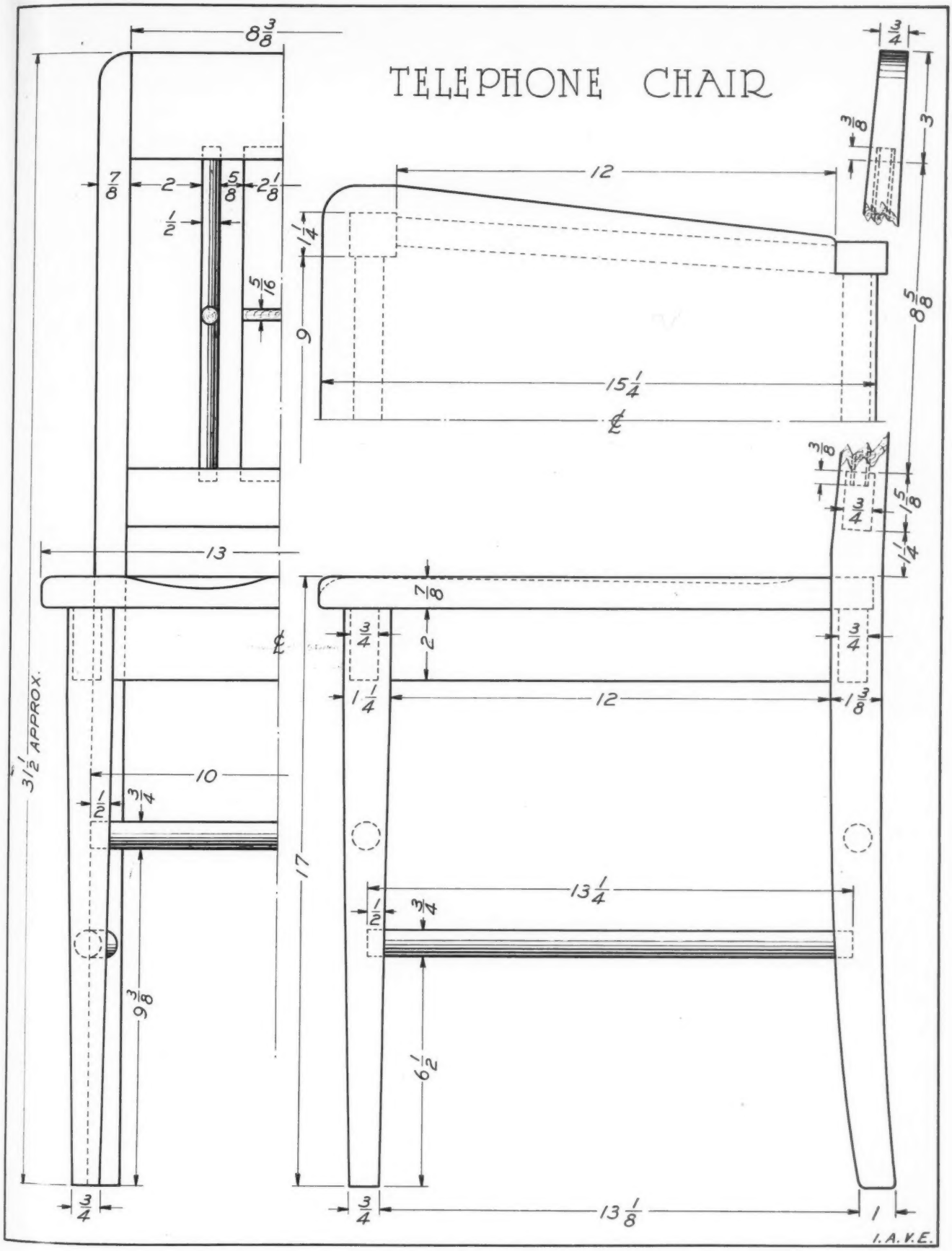
The principal and instructors will be very pleased to have you visit your junior-high-school shops at any time and watch your boy and other boys at work.

The following list of learning units are those taught in eighth-grade beginning woodwork, through the medium of a broom-holder project.

1. Selection of stock for a given project.
2. Squaring up of stock to exact dimensions.
3. Correct use of the rule, try square, plane, hand saw, marking gauge, and chisel.
4. Use of a hand plane in making a chamfer or bevel.
5. Use of patterns for laying out a curved design.
6. Use of the electric scroll saw to cut out a curved design.
7. Use of the electric drill press to drill large holes in wood.
8. How to assemble correctly with wood screws.
9. How to use a homemade-drill stop gauge in drilling holes to an exact depth.
10. How to sandpaper a surface and prepare it for an oil-stain finish.
11. How to apply an oil stain.
12. How to apply satin-finish varnish over an oil stain.
13. How to fasten an article to a plaster, wood, or composition wall.
14. How to figure the cost of materials in a project.




*Submitted by James Chadek, Appleton Vocational School, Appleton, Wisconsin*




*Submitted by James Chadek, Appleton Vocational School, Appleton, Wisconsin*

# Aluminum Etchings and Dry Points

R. T. Griebling

*Pittsburgh, Pennsylvania*

*A fine hobby.*

If you're looking for a new hobby, then try to make etchings and dry points by a method which has greatly simplified this 400-year-old art. You'll not only have a great deal of fun, but, if you're good enough, you can actually make some pocket money besides. And it won't take you long to do it, either.

From these etchings and dry points any number of prints may be made for presentation to your friends. As to making pocket money, you can do this by taking orders for personalized Christmas cards in autumn. You can submit your design at that time, or else find out what your customer wants. Then make the plate, show it to the customer, get his approval to go ahead, and then do your printing, delivering the finished cards by December 15 at the latest.

Etching and dry pointing were formerly considered as advanced subjects in the art schools, and were not taught to beginners, principally because the acids used were quite dangerous. But by the new method these objections were removed, and that is the reason the kit, which contains the paraphernalia necessary to make etchings by the new method, is being so enthusiastically received by art teachers.

To begin with, one of the old drawbacks to developing a love for etching was the etching press. The standard artists' press is six feet high, weighs several hundred pounds, and is firmly anchored to the floor, obviously not the sort of device that can be easily moved about. Its cost is also prohibitive for the average enthusiast. These presses are confined to schools and to cellars of established etchers. See Figure 1.

A new press, weighing only 17¼ pounds, has been developed in order to popularize the new method of making etchings. This press can be conveniently clamped to any table and can be operated with ease. The large old-type press could be operated only by artists who had brawn in addition to brain. The development of the new press is the largest single contribution to the art of etching that has been made in years, for it is inexpensive, compact, and sturdy. Its universality puts etching and dry pointing within the range of all. Where etching classes are instituted, only one press is needed, for the students may take turns in doing their printing. Thus they only need the materials for the production of etchings and dry points.

Now let's see how easy it is to make an etching — or a dry point — by the new method. First of all, it is wise to buy the etching kit* now available, which contains everything that the hobbyist needs. Included in the kit are the following:

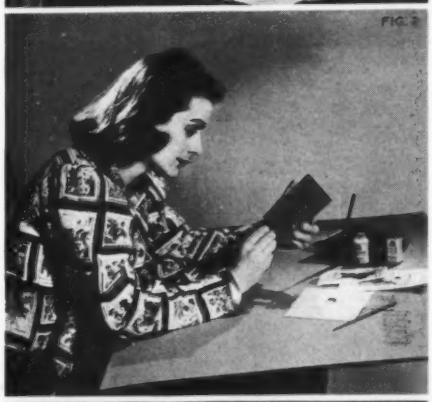


*Fig. 1. Examining the new aluminum etching plates. In the forground is the small etching press and some of tha articles contained in the etching kit. Contrast the small press with the large, old-style press in the background.*

*Fig. 2. How an etching is made. The artist does the preliminary sketching with a soft pencil directly on the aluminum surface*

*Fig. 3. The next step is to go over the pencil lines with the sharp point of the stylus, cutting through the hard surface of the aluminum plate*

| | |
|---|---|
| Etching plates | Ink |
| Etching tray | Ink mixing plate |
| Etching powder | Ink thinner |
| Protective fluid | Ink remover |
| Solvent | Wiping cloth |
| Etching paper | Stylus |
| Tracing paper | Extra stylus points |
| Carbon paper | Thumb tacks |
| Blotting paper | Burnisher |
| Brush | Hand soap |
| Inking roller | Instruction |

Read the book of instructions carefully, for it is clearly written and easily understood. It not only tells how etchings and dry points are made, but gives some of the tricks which are used to make most effective prints.

Beginners sometimes want to make a copy of another sketch or drawing. If that is the case, they can take carbon paper, lay it over one of the plates, and trace the drawing on the plate in that manner. But we believe that those of our readers who are sufficiently interested in the new hobby will also have sufficient skill to start from scratch, and, rather than trace, will draw directly on the plate, as regular artists do. So here goes:

Take a plate from the kit. These plates are not copper, which has been the traditional medium for etchings and dry points, but aluminum, and they have been given a special coating which is very hard and durable. Because this coating is so hard, it is possible to make a great number of prints before the plate becomes so worn that it is unusable.

Take a soft pencil and make your preliminary sketch directly on the plate. This is possible because the color of aluminum is light and the penciled lines are easy to see. This can't be done, except with difficulty, in the case of a metal with a dark color.

After the preliminary pencil sketch has been made, take the stylus and cut into the surface of the plate along the pencil lines. This causes the surface to be broken sufficiently so that the acid later on can do its work properly, for the surface coating is so hard that it resists the work of the acid.

Then take some of the acid crystals from the bottle (half a teaspoonful is enough), and dissolve them in a cup of water. Pour the solution into the etching tray, and you're ready for the next step.

The manipulation of the stylus is called dry pointing because no acid is used. In dry pointing, the depth and width of the line depends upon the pressure with which the stylus is applied. In etching, the heavy lines are made by allowing the plate to remain in the etching solution for a long time.

It only takes the acid a short time to dissolve. This acid does not hurt fingers or

*Editor will gladly give name of dealer selling kits.

clothing, but it naturally should be kept away from eyes and mouth. As soon as the plate is immersed in the solution, the acid begins its work. The solution is quite clear, and the activity can be watched. The acid digs into the lines that have been opened up by the stylus and chews away at the metal. Tiny particles of aluminum are brought to the surface of the line. They may be removed by a wipe of the finger.

When the plate has been immersed a sufficient length of time, it is taken out and dried. A spot of ink is then put on the mixing plate and spread over the surface by the roller. Part of the ink, which is sticky, not liquid, is deposited on the roller, and then the roller is rotated over the etching plate.

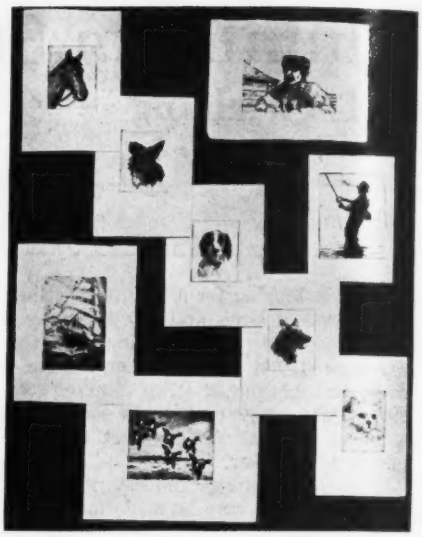
*Fig. 4. After the lines have been cut with the stylus, immerse the plate in the etching solution, where the acid bites the lines deeper*

*Fig. 5. The lines that are to remain light are covered with a protective fluid on which the acid has no effect. The plate is then re-immersed. The depth of line depends upon the length of time in which the plate is subjected to the acid*

*Fig. 6. Inking the plate. A small amount of printing ink is deposited on an inking plate, shown in the foreground. Then a roller is used to spread the ink over the etching plate. A square cloth is fluffed into a ball, and this is used to wipe the ink thoroughly into the lines made by the stylus and the acid. It also wipes the ink off the surface of the plate.*

*Fig. 7. The plate is then ready for printing. The paper used must be soaked in water so that it is quite moist. The artist is shown inserting a sheet into the press. The plate is placed on the platen, which is held in place by the press rollers, then the paper is laid over the plate, and protected from the top roller by a piece of felt. The handle of the press is then turned, causing paper, plate, and platen to travel through the rollers, thus producing the print*

*Fig. 8. After the print has been made, it is placed between blotters to allow it to dry. Then the etcher signs his or her name in pencil in the lower right-hand corner, just beneath the printed subject, and in the lower left-hand corner the number of impressions and the number of prints in the edition made from this plate, is placed. Thus, 4/250, means that the print is the fourth of an edition which is restricted to 250 prints*



*A representative group of etchings and dry points made on aluminum plates*

Thus the ink is spread over the entire surface of the plate. To insure equal distribution of the ink into every line of the plate, it is wise to follow through by rubbing the ink over the plate with the fingers. They get good and dirty, but that's part of the fun.

Now the excess ink must be removed, for the surface of the plate must be entirely free from ink if a good print is to result. The wiping cloth is used to take away the superfluous ink. Again one must use the hand if one is to get best results. And for a perfect wipe the heel of the hand and the base of the thumb is necessary. There's nothing like the human skin for certain jobs, and this is one of them. That's the reason the hand soap is included in the kit!

The inked plate is laid on the platen of the press. This is a flat wooden board that passes between the rollers. Printing paper is then laid over the plate. This paper cannot be used dry, for several reasons. First, it would not take the ink as well as when wet, secondly, it would tear around the edges because the plate would cut into it during printing.

Paper must be soaked in water for some time before use. Many artists soak the paper overnight to be sure that it is thoroughly soft. For ordinary prints this is not necessary. An hour's soaking is usually sufficient.

The paper is blotted to remove excess moisture and then laid on the aluminum plate. A felt blanket is placed over the paper and plate, and then platen, plate, paper, and blanket are run through the press. The result is a print — a joy to behold, even if it is your first effort!

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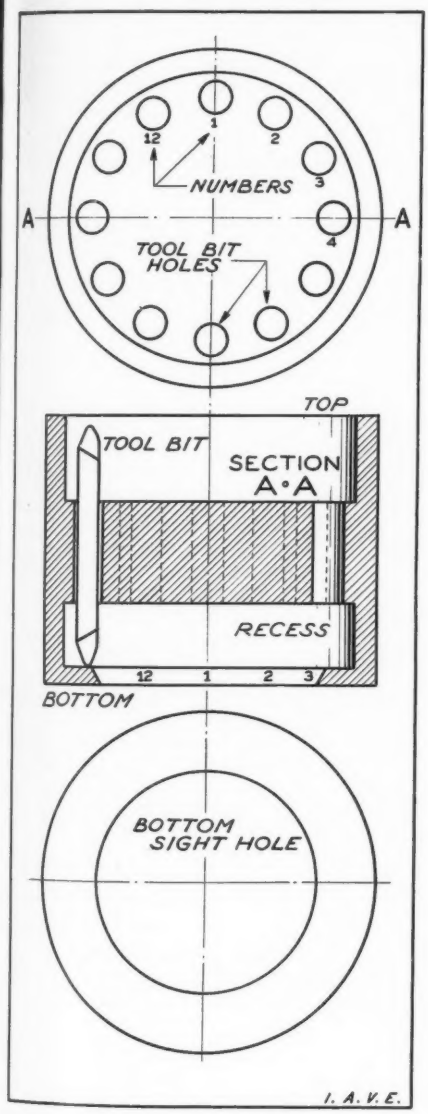
The longer on this earth we live and weigh the various qualities of men, the more we feel the high, stern-featured beauty of plain devotedness to duty. — *James Russell Lowell.*

# Problems and Projects

## NOVEL TOOL-BIT HOLDER

**H. Moore, Kirkstall, England**

For small tool bits, a holder can be made that not only keeps all the tool bits together, but also keeps them in such a way that there is no danger of the operator receiving cuts when he passes his arm over the top of the holder. Furthermore, it enables him to have a clear view of both ends of the tool bits without having to lift each one out separately to see how the other end is ground.




*Novel Tool Bit Holder*

The tool holder is made of metal turned up as shown, with a recess in the bottom and twelve holes equally spaced about a circle. It may be seen that the tool bits rest on a shoulder in the bottom, and that the tops are below the level of the holder.

When selecting a tool, those in the top are first looked over, and if the required slope is not found there, the palm of the hand is then placed over the top of the holder while it is being turned over to view the other end of the tool bits. When the required one is seen, the number of the hole is noted, and as a corresponding number is stamped on the top of each hole, it is easily picked out.

## BRILLIANT COLORED CHRISTMAS CARDS

**May Lillian Lampe, Weehawken, New Jersey**

Christmas, with all its inspiration, is near at hand, and it is time to formulate plans for individual color schemes and layouts for unique Christmas greeting cards.

Color is an important element in these creations, for while the eye may delight in the constructive effect of a fine idea, yet the color — bright dashes of it — simply captivates the recipient.

In block designing and cutting, whether it be linoleum, art-craft composition, or parra, a drawing in outline is all that is required. After the impression is made on the card, either a light ink on a dark background or vice versa, and the card is thoroughly dry, bright opaque colors can be laid on, and this will be as individual as the most exclusive shop-produced card.

The importance of color in everyday life is little realized or appreciated. Try, for a moment, to picture the world without color. Imagine the sky without blue, the gold taken from the sunshine, the green from the grass and leaves, and the red of the blood taken from the flush of the cheek, the darkness from the iris of the eye, Christmas without red berries, green fir trees, and beautiful tree decorations, and one will soon realize how much the world owes to color and how the love and an understanding of color and its use should be instilled in the young.

Christmas cards, away back in 1845, were lithographed and hand colored. As far as is known, the first Christmas card was designed and sent by W. C. Dobson during Queen Victoria's reign in England. It was carefully lithographed and hand tinted by him. A year later, 1846, John Calcott Horsley, of the Royal Academy of London designed a card for Sir Henry Cole, because, as the story goes, the latter's correspondence had gotten ahead of him, and in desperation he conceived the idea of cards, sent to all alike, to take care of the situation. In 1874 we find the fad brought to America where Louis Prang started to print Christmas cards in

Roxbury, Mass., by a lithographic process of his own, producing as many as twenty colors.

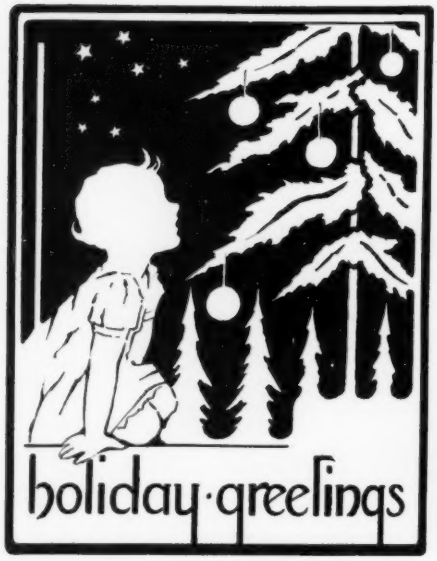
Red and green are the customary colors used on Christmas cards. This complimentary combination became definitely popular in all countries, probably originating because of the bright red and green of the holly and the green of the fir tree. Recently yellows, blues, silver, and gold, have been added, but the demand for red and green still predominates.

Germany has the distinction of being the first country to bring the Christmas tree into the house and trim it. As far back as 1604, in Strassburg, records show this to be a fact. In England, Queen Victoria and Prince Albert introduced the custom, and in America, as far back as the New England settlers, the fir tree was chopped down by the head of the house and brought in to be decorated with homemade dolls, candies, popcorn, and paper ornaments.

The following ideas are excellent for Christmas cards:

Bells, which in the past were looked upon as being sentient beings; candles, which express peace and joy and are a symbol of enlightenment; the fireplace with burning logs to denote cheer and plenty; evergreens with berries and cones; snow scenes, showing bushes and fir trees in the background.

In regions where snow abounds at Christmastime, it may be well to portray its possibilities on the greeting cards. The playing of colors upon a blanket of pure white snow is very interesting. All nature borrows and lends color. It is a sort of give and take, without any thought of retracting. Perhaps a bit of purple, or green grays, or blue greens are borrowed from the near-by farmhouse, tree trunk, or fence, and mingled with the shadows on the snow. Or perhaps a bit of crimson is borrowed from the setting sun, and preserved to cheer the recipient of the card on days that are gray and dismal. The most casual observer has, no doubt, discovered that white and black in nature are influenced by yellows, blues, and reds. In fact, there is a very wide field for observation and study open for the teacher and the student who contemplates making his year's Christmas project a color card of outstanding beauty.



## TOY MOTOR

**William J. Stinson, Junior High School, Auburn, New York**

The simple motor described herewith runs on one or two dry cells. With two dry cells or a toy transformer, it will drive a small fan, toy machines, and devices made with erector sets, using a rubber band as a belt.

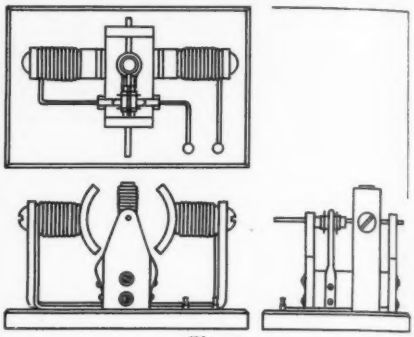


*Fig. 1*

The boys are furnished the base, bearing plate, and bearing support block, cut roughly to shape (Fig. 2).

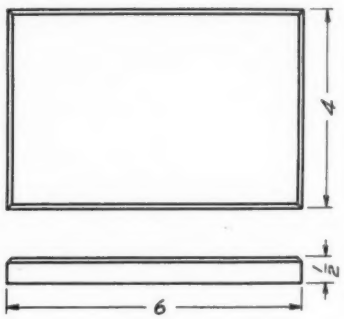



*Fig. 2*

### Base

*Material:* Softwood chamfer top edges.

### Field Frame

*Material:* Band iron, 3/16 by ¾ by 9¾ in.

Use steel rule, square, and scratch awl to lay out the bending lines as shown in Figure 3. Bend the piece in the vise as shown in Figures 4 and 5. Center punch and drill the ¼-in. holes as shown in Figures 4 and 6.

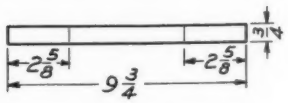



*Fig. 3*

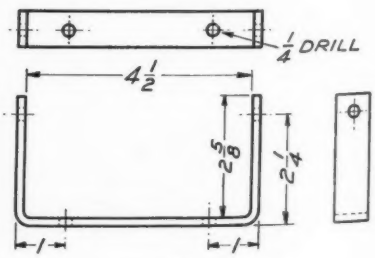



*Fig. 4*

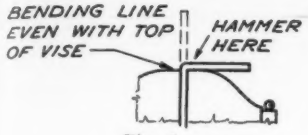



*Fig. 5*

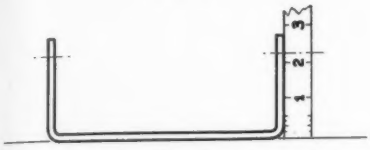


*Fig. 6*

### Field Shell

*Material:* Band iron 3/16 by ¾ by 2 in. Lay out and cut to proper length, as shown in Figure 7. Locate middle and center punch lightly. Use dividers to make sure mark is equidistant from ends. If correct, center

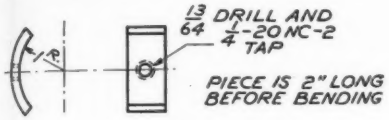



*Fig. 7*

punch deeper for drilling. The piece is curved to a 1-in. radius by bending around a 2-in. diameter mandrel in vise. Put in drill press vise and drill 16/64-in. hole. Tap threads in hole with ¼–20 tap.

### Field Core

*Material:* ⅛-in. iron pipe, 1 1/16 in. long. Cut to length with hack saw. Cuts must be square or field shells will not be in line. See Figure 8.

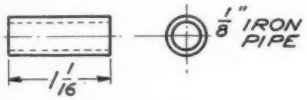



*Fig. 8*

### Base and Field Assembly

Fasten field frame to base with No. 6 by ½-in. r.h. wood screws and washers. Use brad awl to start the screws. See Figure 9.

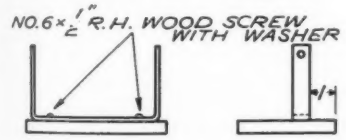



*Fig. 9*

### Assemble Core and Shell

After assembling, as shown in Figure 10, check size of space between field shells. It

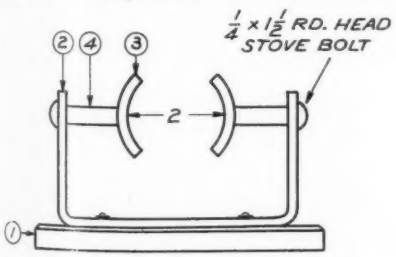



*Fig. 10*

should be a good fir for the 2-in. diameter bending mandrel. Space can be increased by filing field cores shorter — or decreased by placing a ¼-in. washer on bolt at end of field core. If end of bolt protrudes through inside of field shell after making adjustments, file flush with half-round file. Round all corners slightly with file.

### Coils

Coils are wound with 4 layers of No. 20 magnet wire. Wind neatly. Begin at outside end. Leave 6 to 8 in. for connections.

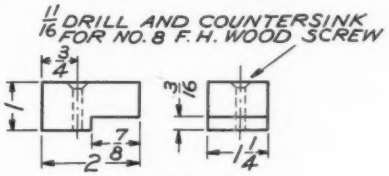



*Fig. 11*

### Bearing Support Block

*Material:* White pine or other softwood. Use try square and marking gauge to lay out. Saw carefully to lines. Hole is drilled with twist drill held in a hand drill. See Figure 11.

### Bearing Plate

*Material:* ¼-in. white pine or other softwood.

Saw out a rectangular piece as shown by dotted lines in Figure 12. Lay out as shown, and saw and file to shape. Use hand drill to drill shaft hole and screw holes.

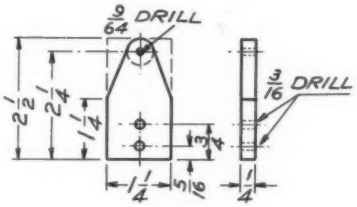



*Fig. 12*

### Armature Core

*Material:* Mild steel rod, ⅜ in. diameter. Cut to length indicated in Figure 13. Hold in vise and center punch in middle. Check as in directions for field shell. Drill hole on drill press. Use vise and V plate as shown in Figure 14.

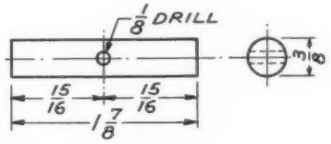



*Fig. 13*

*Fig. 14*

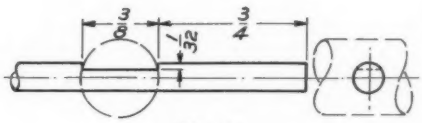



*Fig. 15*

### Shaft

*Material:* ⅛ by 3½-in. diameter steel rod. Cut a 3½-in. length and file ends smooth. The double-size drawing, Figure 15, shows how a flat is filed ¾ in. from one end. Slide shaft into hole in armature core until flat section is inside core. Put on anvil and hammer core to lock shaft.

### Commutator

*Material:* 1 piece wood dowel rod 5/16 in. diameter by ¾ in. long.
1 piece No. 20 gauge brass tubing ⅜ in. o.d. by ½ in. long.
2 fiber washers ⅝ in. diameter with ⅜-in. hole.

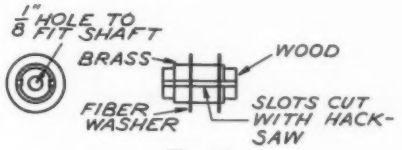



*Fig. 16*

Put dowel rod in lathe chuck. Start hole with center drill and then drill through with ⅛-in. drill. See Figure 16. Now slide brass tube onto dowel rod and grip lightly in vise as shown in Figure 17. The slots are cut with a hack saw using the edge of the vise jaw as a guide so that the slots will be parallel to axis of commutator. Notice that second slot is sawed directly opposite first. When both

*Fig. 17*

slots are cut through to the wood, remove from vise and file sawed edges smooth. Put small amount of glue on inside of each segment and replace on wood. To make fiber washers, lay out a ⅝-in. circle on sheet fiber. Then cut out ⅜-in. hole in center with No. 6 wood bit. Support fiber with piece of scrap wood while boring. Complete by cutting to outside circle with tin snips. Fasten washers in place with ambroid cement, as shown.

### Armature Winding

Armature is wound with two layers of No. 20 magnet wire. Begin winding at shaft. Wind out and back on one half of core, then cross

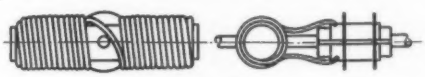


*Fig. 18*

wire over shaft and repeat on other half. See Figure 18. Clean and *tin* a small spot on each commutator segment and slide commutator on shaft within ¼ in. of coil. Cut, clean, and *tin* the wire ends and solder one end to each commutator segment.

### Bearing Assembly

Fasten bearing support block to base with one No. 8 by 1½-in. f.h. wood screw. Screw one bearing plate in place with two No. 6 by ⅝-in. r.h. wood screws with a washer under each head. Put armature in place and add other bearing plate. Adjust bearing plates until armature turns freely and is equally spaced from field shells. The whole field

assembly may be moved, if necessary, by loosening screws which hold it to base.

### Brush

*Material:* No. 26 gauge sheet brass.

Use tin snips to cut to shape shown in Figure 19. Drill holes with hand drill while holding brass in vise against scrap wood. Bend to shape shown in assembly drawing and fasten in place with No. 4 by ⅝-in. r.h. wood screws. Notice that upper screw is not tightened. It is used for brush adjustment.

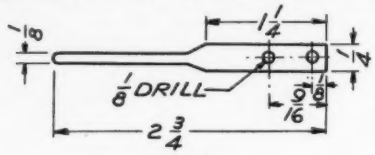
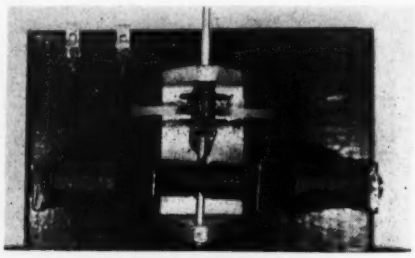



*Fig. 19*

### Special Comments

1. The field construction in this motor is sturdy and produces a good field by using ⅛-in. iron pipe over ¼-in. stove bolt.

2. The bearing plates are adjustable, as is the field location on the base, so that small deviations from the drawing specifications can be adjusted for.



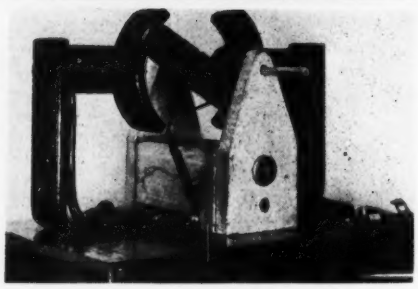


*Fig. 20. Front and Top View of Assembled Motor*

3. While my 7th graders use a two-slot commutator, more advanced boys could use one with four slots and have two dead segments for greater efficiency.

4. In making the fiber washers, my students bore the inside hole in a square blank and I turn the outside to size on a mandrel in the lathe.

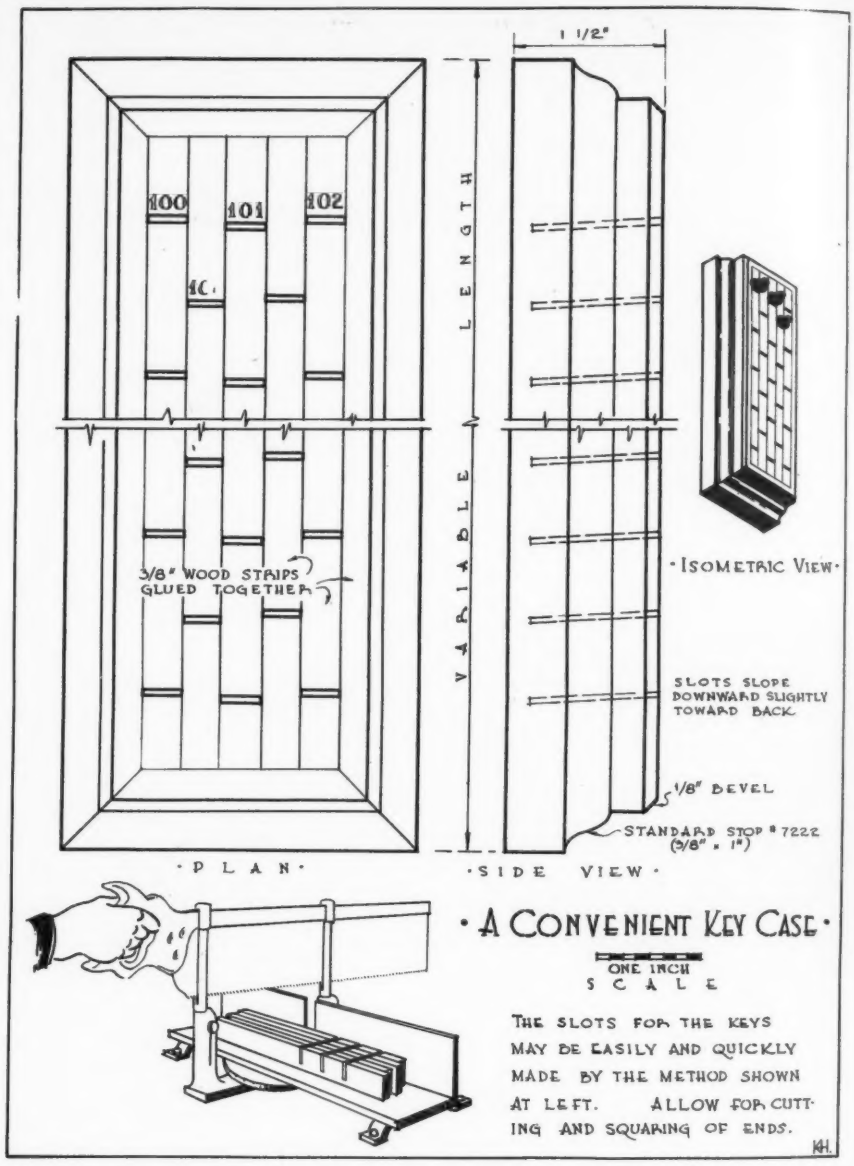
5. This motor may be used to drive toy machinery by using a rubber band as a belt.

## A CONVENIENT KEY CASE

**Keith Hinchcliff, Fayetteville, Arkansas**

When a limited number of keys are used by several people in the same building, and it is not advisable to have too many duplicates, a key case or board such as described and detailed here is very handy.

It has many advantages over the hanging key kind, since the key fits into a slot mostly out of sight, yet a quick checkup can be made to see if any are missing.




The slots for the keys may be very easily made by using a number of wood strips about ⅜ in. thick by 1½ in. wide, cut as shown in the illustration. They are then staggered and glued together. The length and number of the strips are determined by the number of keys to be accommodated.

Combinations of woods, preferably hard, may be used. The slotted section, for instance, may be made of oak and the outside strip of walnut, thus securing a framed appearance.

## A WALL LAMP IN PLASTICS

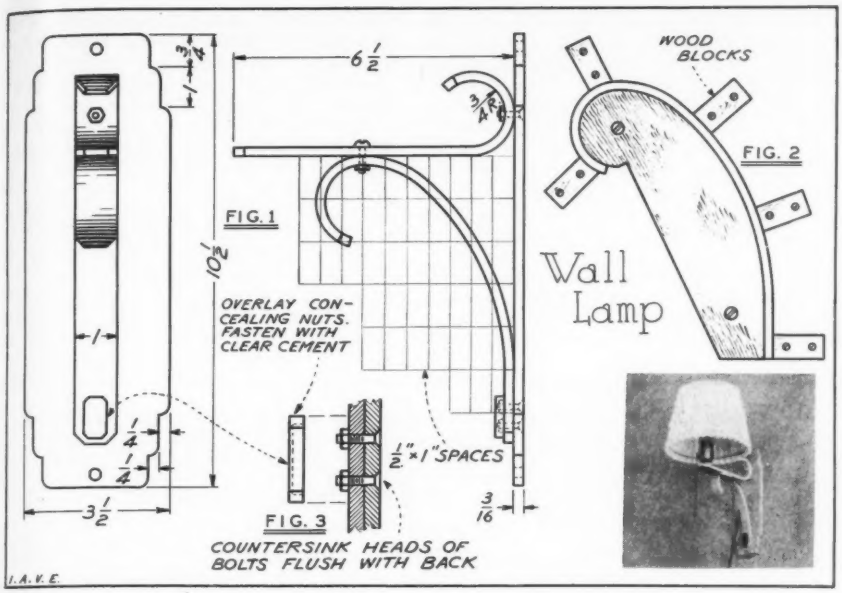
**William L. Dorrance, Whittier Junior High School, Lorain, Ohio**

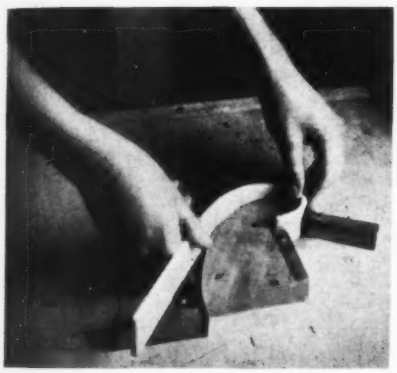
The use of plastics in the school shops has been steadily increasing. This is due to a number of reasons; the color range is very wide, the material works well with the ordinary tools, small space is required for storing the stock, and the cost is reasonable. The material for the lamp described here costs well under a dollar, including the socket and cord.

Figure 1 in the drawings shows the general construction of the lamp. The base may be sawed out on the band saw or with a fine-toothed coping saw. It should then be finished with a flat file and No. 3/0 sandpaper.

Figure 2 shows a layout of the largest of

*Immersing the plastic strips in hot water in preparation for bending*



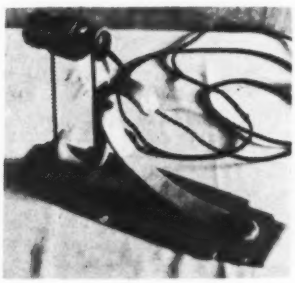



*Bending the strip around the form*

the two bent pieces. Cut out the two strips, 1 in. wide by 12 in. for the long one, 10 in. for the shorter one. File the edges smooth and sand. The bevels on the ends may be cut off after bending. Saw out a form to the size of the inner curve and fasten to a flat surface. Fasten the small wood blocks around the form so that they are just the thickness of the plastic material.

Immerse the strip of plastic in hot water until it becomes pliable, and quickly bend it around the form, pushing it down between the blocks and the form. Be careful that the strips are well softened before bending.

Follow the same procedure for the smaller pieces, using a different form. The material should be left in the forms until cooled.



*The assembled lamp showing method of fastening the bent pieces to the base*

Sand the pieces thoroughly, removing all scratches and then buff until the desired polish is obtained.

Center the two bent pieces on the base and mark positions for the holes. Figure 3 shows the small brass machine screws in place, and the small overlay, hollowed out to cover the bolts. The overlay piece may be of a different color.

## A CHRISTMAS ACTIVITY

**Leonard Dougherty, Supervisor Industrial Arts, Louisville, Kentucky**

Supervisors and teachers, who are searching for an activity program which will stimulate the interests of pupils, and provide a challenge for research and creative effort on the part of both teacher and pupil, will be interested in this account of the Christmas toy shop in the Louisville public schools.

The idea of rehabilitating old toys and distributing them to poor children at Christmas was first introduced at the Louisville Normal School in 1918 by Miss Elizabeth Breckinridge, the principal. Old toys, dolls, and games were donated by pupils of the school. These toys were repaired in the woodshop, redecorated in the art room, and the dolls were repaired and dressed by the sewing class. This activity was used as a basis for all types of related studies throughout the entire school.

Each year this work expanded and attracted such widespread attention that it has now become a permanent institution sponsored by the community Christmas committee, which is headed by the mayor, himself, and is composed of leading business and professional men and women.

In October of each year, the supervisor and teachers of industrial arts meet and plan a program for the designing and the construction of new toys by pupils of the secondary schools. In addition, plans are made for the collection and rehabilitation of old toys contributed by pupils and teachers. The program for the industrial-arts classes is arranged so that this toymaking forms a basis for instruction in tool processes, design, shop mathematics, citizenship, health, art appreciation, and related social studies.

The accompanying illustrations show only a sampling of the 1,650 new toys made in the school shops. The girls in the sewing classes also made sheets, spreads, and pillow cases for the doll beds, and dressed 586 new dolls.

Some of the means employed in creating interest, providing materials, stimulating research, and in making application of the enthusiasm aroused by this activity are as follows:

1. Pupils of the art classes make posters announcing "Toy Day." These posters are painted in brilliant colors of tempera and are posted in the school corridors.

2. Assembly programs are presented which set forth in dramatic form conditions existing in the home life of the poor in the community, the gloom and despair which hover over the destitute children as Christmas approaches, and the joy which is brought into the lives of these unfortunate children by the gifts of toys and dolls from the school workshops.

3. Appeals for gifts and cooperation of citizens in this project are made over the radio.

4. Boy-scout troops volunteer to collect toys from the homes where the children are too small to take them to school.

5. Funds for defraying the cost of materials are raised by the public donations through the "Mile of Dimes."

6. Pupils are requested to bring tin cans, boxes, and the like, from which toys are made.

7. Merchants contribute broken and damaged toys, which in many instances can be restored to perfect condition by simple repairs.

8. Newspapers cooperate in providing publicity through pictures and articles.

The interest in this project, which originated in the public schools, has spread throughout the city and embraces the council of social agencies, luncheon clubs, churches, veterans' organizations, merchants, and recreational groups, who contributed over 1,000 new toys and assisted in the rehabilitation of over 2,000 old ones this year.

More than 5,000 poor children were provided with toys on Christmas of 1938 through this project. The happiness that was brought to these children made all of the effort involved worth while. In addition to this civic contribution, a great educational value is found through the stimulation of pupil interest in social, technical, and aesthetic phases of the school program.

This toymaking project is one of great functional value in the life of secondary-school pupils, and it offers a wide field of interest for the teacher to explore. It has proved to be a great stimulant for creative thinking.

## ESTABLISHING A SHOP FILING SYSTEM

**Deane E. Eldridge, Industrial Arts Department, Junior High School, Plymouth, Massachusetts**

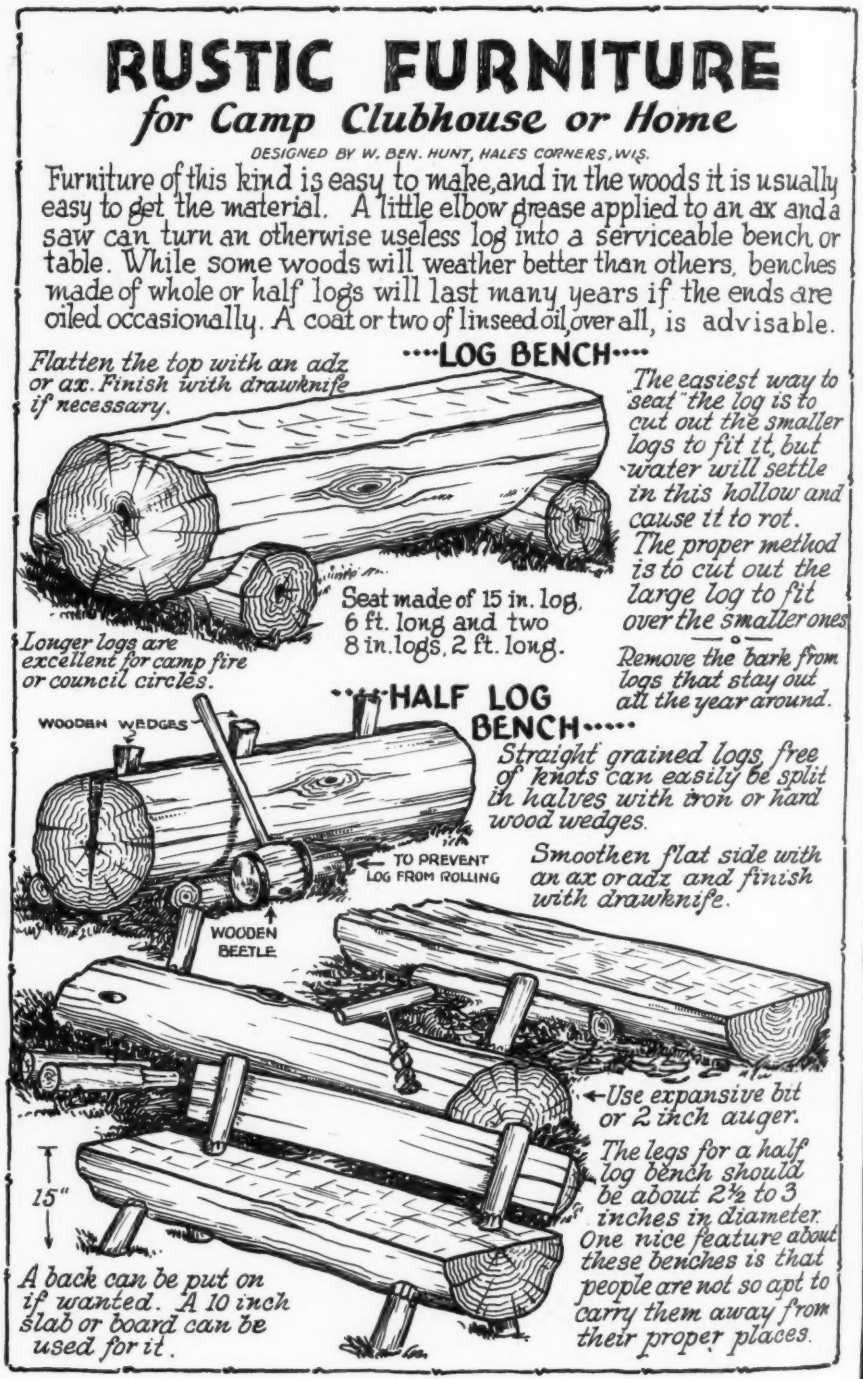
Few teachers of shopwork have started their teaching career with a definite idea of how best to care for the instructional material which they find so necessary for their job. Seldom does this material consist so much of books, as it does of catalogs, correspondence, folders, charts, and pictures collected from here and there. The collecting and filing of this material proves to be a greater problem than the beginner at first believes and he soon finds that the proverbial notebook is not the answer to the problem.

The writer passed through the notebook and shoe-box stages of collecting and finally realized that an organized filing system was the only real solution of the problem. The industrial-arts subjects are changing so rapidly that it is necessary to save and use materials which have not yet been put into book form, and only by a filing-cabinet system can this be managed in a neat and systematic manner.

The accompanying illustration shows how a regular 10 by 13-in. filing cabinet can be easily constructed if the standardized sectional cabinets are not available. These latter are usually made of wood or metal and are excellent although somewhat expensive. Considerable saving may be found in constructing one's own cabinet and it proves an excellent project to carry through with the classes. See illustration on page 382.

One drawer of the cabinet should be given over to the collecting and tabulating of projects. In my own case there is a predominance of woodworking projects but this will vary with the instructor and his subject. Heavy manila envelopes are used. The names of the projects should be printed in the upper left corner of each envelope and arranged alphabetically in the drawer. When pictures or drawings are found (and it is surprising how often these appear when you have a place to put them) there is always a proper place to file them until they are needed. New projects will be found occasionally and new envelopes will have to be added but it is a poor teacher whose filing cabinet doesn't grow. The writer has found it convenient to include a group of envelopes for sheet-metal and wrought-iron projects in the same drawer, for the two subjects go hand in hand with woodworking.

The second and third drawer should be outfitted with alphabetical index cards and


RUSTIC FURNITURE
for Camp Clubhouse or Home
DESIGNED BY W. BEN. HUNT, HALES CORNERS, WIS.
Furniture of this kind is easy to make, and in the woods it is usually easy to get the material. A little elbow grease applied to an ax and a saw can turn an otherwise useless log into a serviceable bench or table. While some woods will weather better than others, benches made of whole or half logs will last many years if the ends are oiled occasionally. A coat or two of linseed oil, over all, is advisable.
LOG BENCH
Flatten the top with an adz or ax. Finish with drawknife if necessary.
The easiest way to seat the log is to cut out the smaller logs to fit it, but water will settle in this hollow and cause it to rot. The proper method is to cut out the large log to fit over the smaller ones
Seat made of 15 in. log, 6 ft. long and two 8 in. logs, 2 ft. long.
Longer logs are excellent for camp fire or council circles.
Remove the bark from logs that stay out all the year around.
HALF LOG BENCH
WOODEN WEDGES
Straight grained logs free of knots can easily be split in halves with iron or hard wood wedges.
TO PREVENT LOG FROM ROLLING
Smoothen flat side with an ax or adz and finish with drawknife.
WOODEN BEETLE
Use expansive bit or 2 inch auger.
15"
The legs for a half log bench should be about 2½ to 3 inches in diameter. One nice feature about these benches is that people are not so apt to carry them away from their proper places.
A back can be put on if wanted. A 10 inch slab or board can be used for it.

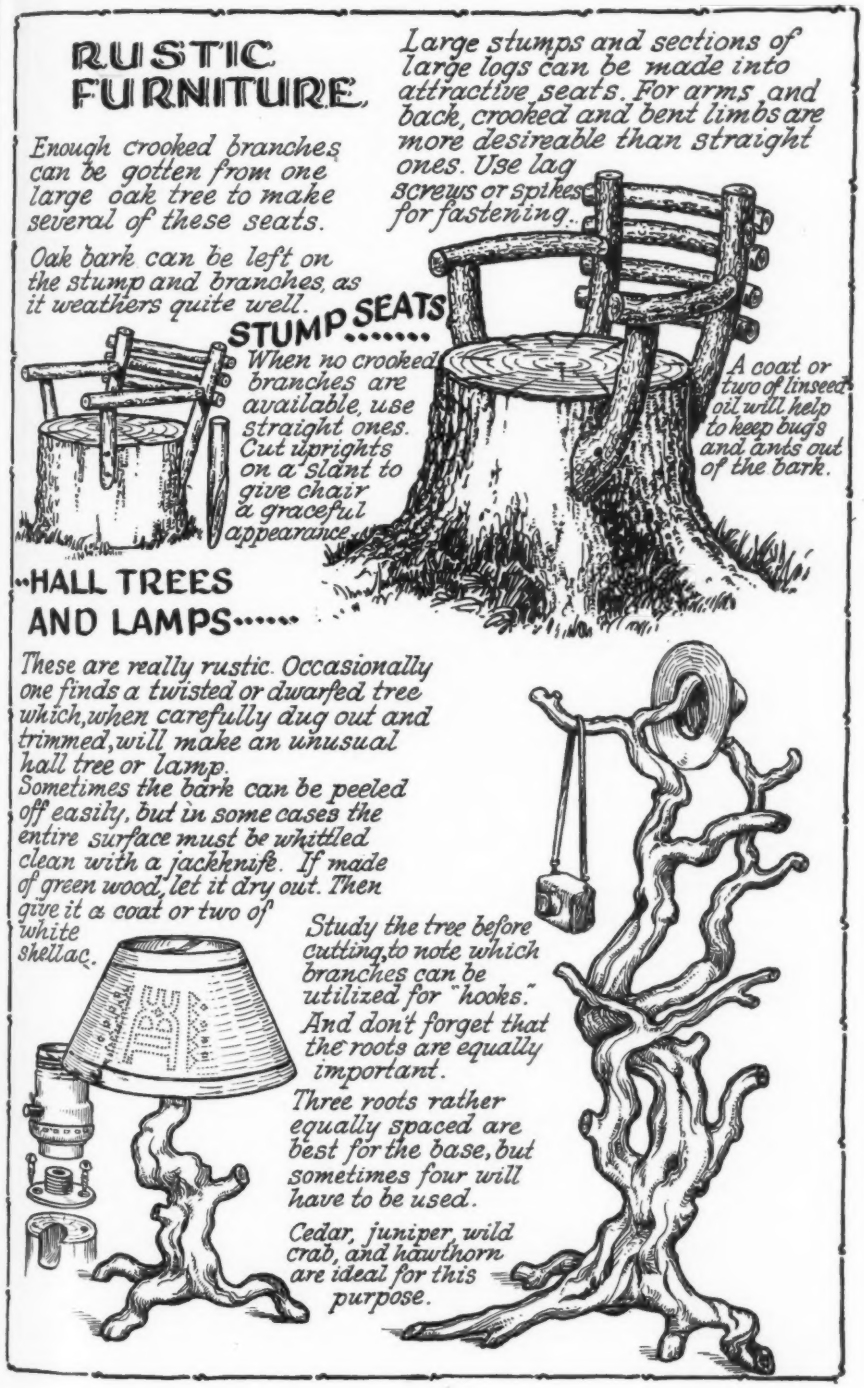
sufficient envelopes and folders to use with them, the latter being used to record the subtitles under each major heading. This article further suggests an alphabetical arrangement of subjects which seem to meet all of the writer's present requirements, although these will vary with the instructor and his subject and his method of organization.

*Projects*

The following alphabetical list of projects should be printed on 9 by 12-in. manila envelopes, into which pictures, drawings, and patterns may easily be kept. Additional envelopes may be added as the filing system grows.

### Woodworking

Airplane models
Arbors
Benches
Boats and boat models
Book racks
Boxes
Buffets
Bulletin boards
Bureaus
Cabinets — ornametal
Cabinets — corner, kitchen, music, tool, sewing, storage, filing
Candleholders
Canoes
Chairs
Checkerboards
Chests — cedar, tool
Children's furniture
Clocks
Costumers
Desks
Display cases
Flower boxes
Footstools
Garden furniture
Gavels
Hanging bookshelves
Highboys
Kiddie cars
Kites
Lamps — table, bridge
Lowboys
Magazine racks
Magazine carriers
Mallets
Mirrors — miscellaneous, Chippendale, split column, shaving
Muffin stands
Musical instruments
Picture frames
Rustic furn ture
Screens — folding, fireside
Serving trays
Ship models
Signs and letters
Skis, sleds, toboggans
Smoking stands
Stage scenery
Taborets
Tables — breakfast, dressing, folding, drop leaf, console, magazine, library, Pembroke, Duncan Phyfe, snake-leg, pedestal, telephone
Tea wagons
Trellises
Toys — animal, cut-outs, advanced
Wastebaskets


RUSTIC FURNITURE
Large stumps and sections of large logs can be made into attractive seats. For arms and back, crooked and bent limbs are more desireable than straight ones. Use lag screws or spikes for fastening.
Enough crooked branches can be gotten from one large oak tree to make several of these seats.
Oak bark can be left on the stump and branches, as it weathers quite well.
STUMP SEATS
When no crooked branches are available, use straight ones. Cut uprights on a slant to give chair a graceful appearance.
A coat or two of linseed oil will help to keep bugs and ants out of the bark.
HALL TREES AND LAMPS
These are really rustic. Occasionally one finds a twisted or dwarfed tree which, when carefully dug out and trimmed, will make an unusual hall tree or lamp.
Sometimes the bark can be peeled off easily, but in some cases the entire surface must be whittled clean with a jackknife. If made of green wood, let it dry out. Then give it a coat or two of white shellac.
Study the tree before cutting, to note which branches can be utilized for "hooks." And don't forget that the roots are equally important.
Three roots rather equally spaced are best for the base, but sometimes four will have to be used.
Cedar, juniper, wild crab, and hawthorn are ideal for this purpose.

### Sheet Metal

Book ends
Cookie cutters
Dustpans
Funnels
Matchboxes
Sconces
Trowels
Vegetable bin

### Wrought Iron

Candleholders
Coffee tables
Fireplace fittings
Footstools
Lamps — table, bridge
Lanterns
Lighting fixtures
Magazine carriers
Plant holders
Sign hangers
Smoking stands
Weathervanes

### Administrative Unit

*Assignments and Accounts*
- *a*) Records of class assignments and accomplishments
- *b*) Orders
- *c*) Receipts
- *d*) Inventories

*Bulletin-Board Materials*
- *a*) Charts, poems, and quotations
- *b*) Special information on shop topics
- *c*) Safety slogans

*Courses of Study*
- *a*) Woodwork
- *b*) Metalwork
- *c*) General shop
- *d*) Mechanical drawing
- *e*) Printing
- *f*) Industrial arts

*Drawing and Design*
- *a*) Elementary design
- *b*) Mechanical drawing
- *c*) Architectural
- *d*) Lettering

*Elementary Woodworking*
- *a*) Tool demonstrations
- *b*) Process demonstrations
- *c*) Glues and gluing
- *d*) Wood fastening
- *e*) Joinery
- *f*) Special processes

*Furniture, Periods of*
- *a*) Ancient (Up to and including Gothic)
- *b*) Golden Age of furniture, Chippendale, Hepplewhite, Sheraton, Adam Brothers, Duncan Phyfe
- *c*) Empire
- *d*) Victorian
- *e*) Modernistic

*General Shop*
- *a*) Layouts, pictures, and descriptions
- *b*) Equipment lists
- *c*) Job sheets

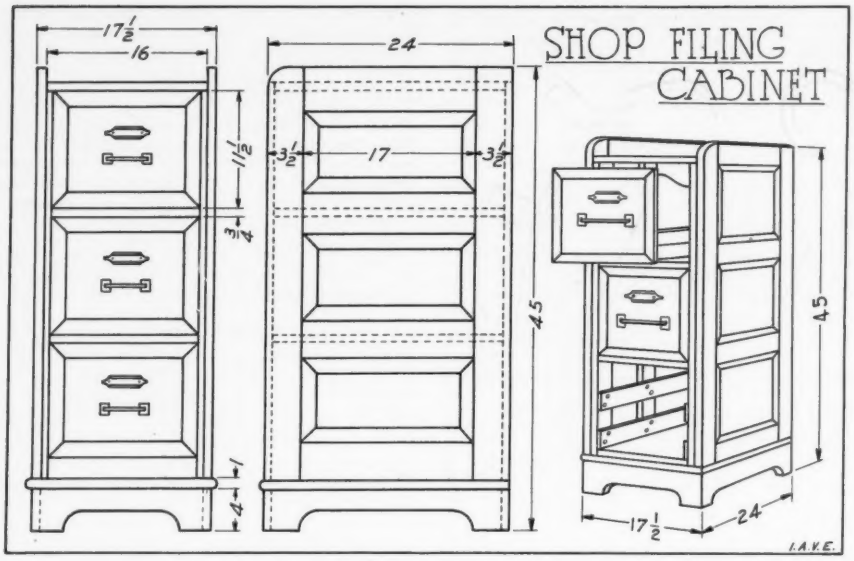
*Hardware — Cabinet*
- *a*) Catalogs
- *b*) History of

*Inlays and Marquetry*
- *a*) Catalogs and samples
- *b*) Pictures of inlaid furniture
- *c*) Decalcomonia transfers

*Jigs and Fixtures*
- *a*) Shop improvements and short cuts
- *b*) Special tools and processes

*Knife Work and Carving*
- *a*) Whittling
- *b*) Machine carving
- *c*) Professional carving

*Lumber and Lumbering*
- *a*) Kinds and prices
- *b*) Logging
- *c*) Sawmilling
- *d*) Manufacturing




*For descriptive material see page 380*

*Machines — Woodworking*
- *a*) Jointers
- *b*) Circular saws
- *c*) Band saws
- *d*) Grinders
- *e*) Surfacers
- *f*) Lathes
- *g*) Special machines

*Related Information*
- *a*) Shop mathematics
- *b*) Shop science
- *c*) Shop English
- *d*) Shop drawing

*Objectives in Industrial-Arts*

*Personal Correspondence*
- *a*) Business concerns
- *b*) Professional
- *c*) Social
- *d*) Addresses
- *e*) Certificates and credits

*Questionnaires*

*Reports*
- *a*) School
- *b*) Industrial-arts reports
- *c*) Addresses and speeches

*Shop Management*
- *a*) Progress charts
- *b*) Magazine articles
- *c*) Assembly programs

*Tests*
- *a*) Standardized
- *b*) Short review tests

*Hobbies*
- *a*) Bibliography of books and articles

*Visual Education*
- *a*) Films
- *b*) Lantern slides
- *c*) Machines

*Wood Finishing*
- *a*) Colors and color mixing
- *b*) Special finishes
- *c*) Equipment

*Metalwork*
- *a*) Sheet metal
- *b*) Art metal
- *c*) Wrought iron

*Molding*
- *a*) Cement work
- *b*) Pattern and castings

*Machine Work*

## HANDY VISIBLE AUGER-BIT RACK

**George L. Simnicht, Luverne, Minnesota**

This auger-bit rack can be made from a piece of one-inch angle iron. The length of the angle iron depends on the number of bits to be hung. The one shown in the illustration is made to hold two each of the most used smaller bits, and one each of all other sizes. The last hole is for the expansion bit.

After laying the rack, use a center punch to mark all holes. After the holes are drilled, cut in the slots with a hack saw. File the slots smooth so the bits will slip in and out of their place easily.

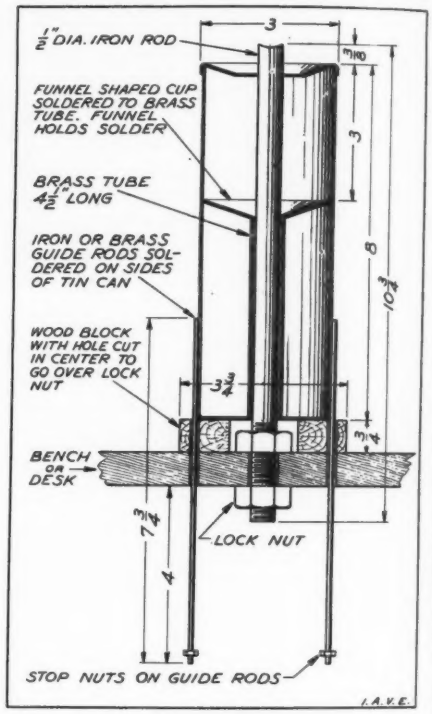
Fasten the rack to the wall or tool cabinet with three No. 6 f.h.b. by 1-in. screws. Countersink for the heads.

The numbers above the auger bits may be painted on the wall or small numbered tacks, such as are used to number storm windows and screens, may be fastened to the wall above the different size auger bits.

## SOLDER DISPENSER

**E. W. Kilgore, Horace Mann Junior High School, San Francisco, California**

One great difficulty, which perhaps every sheet-metal teacher has experienced, is the waste of solder in the shop.

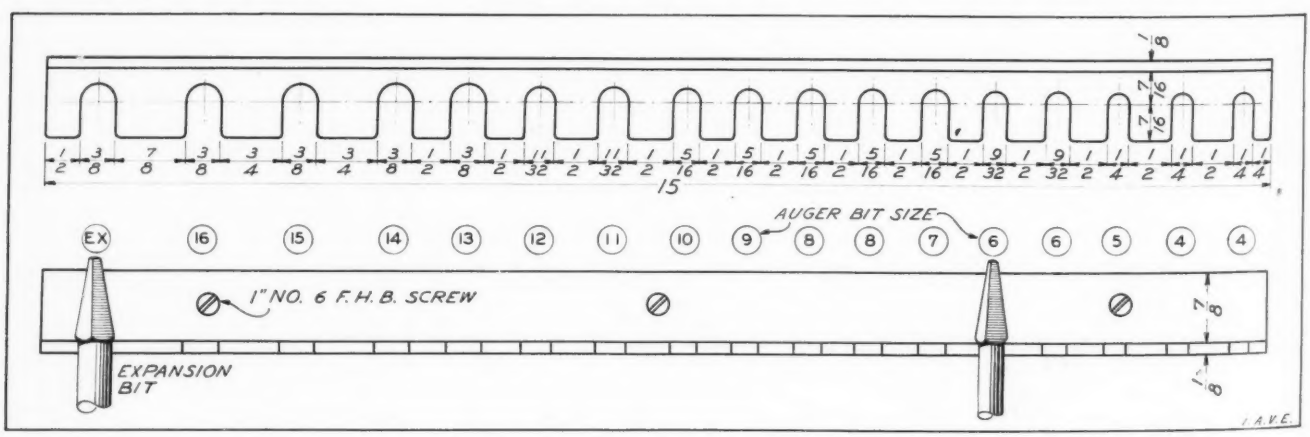



*Solder dispenser*

If it is left so that the pupils can help themselves whenever they need it, there is no end of waste.

The dispenser, shown here, cuts down the waste considerably, as it allows one or two pieces of solder to be obtained at one operation.

First, the string solder is cut into pieces




*Handy Visible Auger Bit Rack*

about 7/16 in. in length. This can be done on the squaring shears. The solder is then placed in the can in small quantities about 1 lb. at a time, and the movement of the can upward leaves one or two pieces of solder on the end of the ½-in. rod.

A buzzer may be connected to the dispenser so that each time it is operated the teacher's attention is notified of the fact that someone is in need of solder. In this way he can keep a check on the solder that is used.

This device has proved very convenient and economical.

## THE FOOT-POWER LOOM

**R. H. Jenkins, Humboldt State Teachers College, Arcata, California**

The discussion up to this point has dealt with the portable table type of loom. We will turn now to a heavier type of loom designed to stand on the floor.

It would easily be possible to attach legs to the models already designed. However, for heavy work, a loom with a sturdier frame would be more nearly permanent and satisfactory. The principles involved, though, are the same, so that there is little new to be developed in the floor model. The heddle movement is, if anything, easier, as it can be worked from below with a foot-lever action. The size again is the main problem to be fully settled before launching on the construction. The main questions to be decided are as follows: What width of weaving is to be done? Is the loom to be moved from room to room? Should it be a type of take-down model, and is it to occupy such a conspicuous location that it must be as attractive as a piece of furniture?

The inside doors of a home are generally 30 or 32 in. in width. A loom to be passed through such a space must, in some dimension, conform to like measurements, unless the loom may be tipped up at an angle, and

*Fig. 2. The floor model*

by this method passed through a door. Twenty-seven inches will be found to be the greatest width that can be woven on a portable floor model. Weaving wider than this will practically demand a take-down type with joints and bolts adapted to such conditions.

In most modern homes, the loom will in no sense be a part of the regular furniture, except on special occasions. At other times, it will be relegated to a storeroom or closet. Under these conditions, there seems little need of putting expensive material into the construction of the loom. Any moderately strong, well-seasoned lumber should do nicely for the frame, and a careful paint job will give a desirable finish to the surface.

A study of Figures 1 and 2 should enable the student to make the loom with little difficulty.

### Weaving

The building of looms was primarily the objective of this series of articles, hence little space has been devoted to the art of weaving. In fact, it may be noted that all of the looms are of the plainest construction, and the weaving of the easiest and simplest forms. All complicated features have been left out, for by so doing it was hoped that the more inexperienced individuals would have the self-assurance to try this most interesting line of work. After these very simple models have been mastered, the more complicated designs can be worked out by those who wish to go farther along the weaving lines. It is not difficult to add more heddles where more heddles are needed.

Upon visiting a woolen mill for the first time, the student probably will feel confused at the vast array of complicated machines, and it is truly fascinating to note the wonders which have been developed along this line. The machines seem almost human in the work they do, and are a far cry from these little homemade devices. However, if the student will go back and visit again and again, he will come to understand and grasp more nearly what is being done. He will find quite a number of the processes not so different from his own. The warp must be run on the rollers, and strung through heddles and beaters by hand, even though the looms are large and the weaving done on an enormous basis. In fact, a visit to a modern mill is an instructive trip in many ways, and very much worth while to the student of weaving. There can be no mistakes if perfect work is to result.

### The Warping Board

The warping board is probably the simplest device for the beginner to use in transferring his warp to the loom. It is a crude method and has its faults, and yet is so simple, that it also has some desirable features.

For example, suppose the beginner wishes to weave a scarf and a handbag. The weaving is to have two border stripes and a main

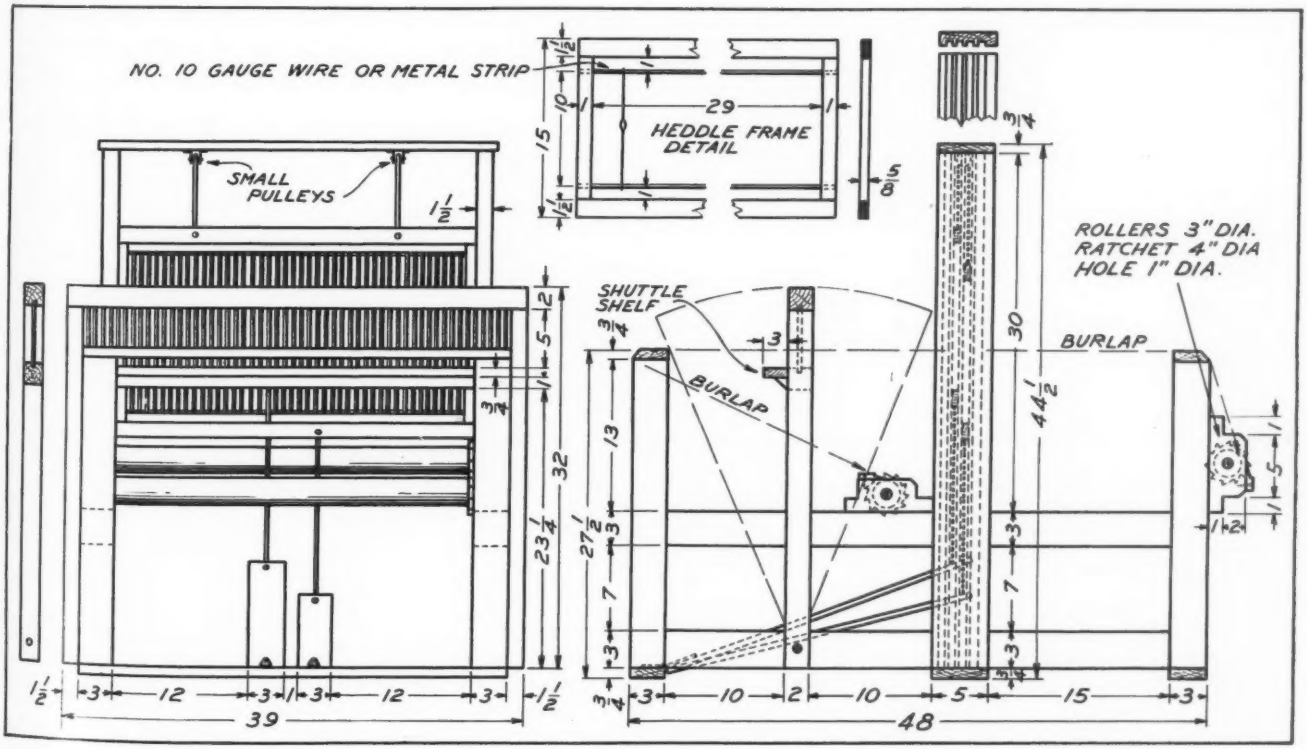



*Fig. 1*

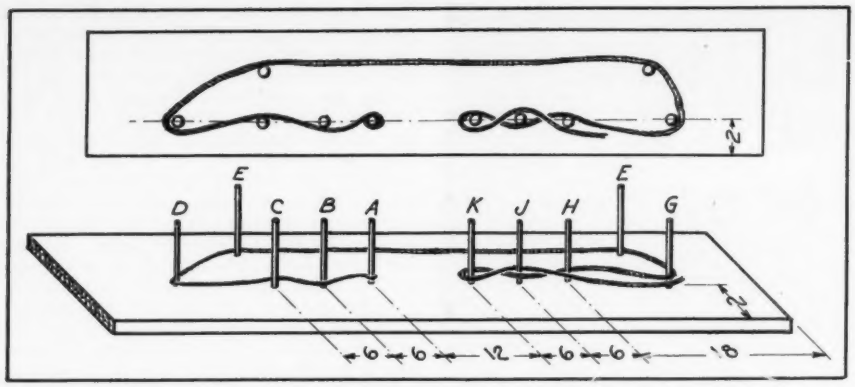



*Fig. 3. The warping board. The order of stringing runs the same as the letters*

body color. The beater on the loom has a 12-dent reed, that is, 12 openings to the inch, and the scarf is to be 7 in. wide. It therefore will take 84 threads to cover the 7 in. However, due to the fact that the selvage is more tightly woven, the material will not be the full 7 in., but more nearly 6½ in. wide. Therefore, if the finished scarf is to be exactly 7 in., it will be better to count on a total of 90 instead of 84 threads. For a beginning pattern, plan for a strip 12 threads in from each edge, and as many more wide. If the yarn is purchased in the ½-oz. skeins, it will take approximately 7 skeins for the body color, and 3 for the design. In any piece of weaving, there are in the neighborhood of from 6 to 8 in. of waste yard which is lost in the heddles and knots. Allowance has to be made for this waste when estimating the total length of the yarn used. Scarfs vary in length and bags in size, so that each of these items, too, must be estimated before beginning the weaving. Let us suppose that 72 in. of warp will cover all these needs.

Procure an old plank or heavy board 8 to 12 in. wide, and 6 ft. long. Bore ¾-in. holes *A, B, C, H, J,* and *K,* as shown in Figure 3.

Whittle out strong pegs 6 to 8 in. long for these six holes, and fasten the pegs firmly in place. Take a piece of string 72 in. long, tie one end to peg *A* and run it in and out between the pegs going toward one end of the board. Make a neat loop and pass the end of the string toward the opposite end and return, winding it in and out between the other pegs. Tie the peg. Then bore four more holes at such points on the boards so that the string will be drawn tight around the pegs in these holes and a neat loop will be formed around the board. These pegs form a frame on which to string the warp. In stringing any loom, the problem confronting the weaver is to get his warp from the skeins, in the right length, and in the correct order, evenly and accurately onto the loom. Arranging the pegs is the first step in this process.

The next task is to transfer the yarn to these pegs, and now that they are in position, the worker should not meet any particular difficulty in this warping process. Wind the yarn on sticks or in balls, if it is in skein form, and, after removing the 72-in. string, tie one end of the main background color to the beginning peg where the string was fastened. Weave in and out among the first two pegs, pass around the outer ones and back again to the finishing peg where the other end of the string was tied. Make a loop around this peg and pass back in and out between the pegs so as to cross over the beginning thread. Return to the beginning, passing in and out between the pegs so as to cross the threads again. Loop around the beginning peg and return to the ending one, following the same route. Try to keep the tension as even as possible, and the order the same all of the time so that the threads will cross at each end. This crossing of the threads at each end is necessary in order to keep each thread in its exact position and to enable the worker to avoid having a serious tangle. Push the threads down as far as possible and yet have them in the same position when they are finally released.

For the scarf described in the foregoing, run 12 threads of the main background, and then 12 more of the contrasting color for the design, onto the warping board. Then return to the foundation color and wind on 42 threads, after which, finish off with the 12 for design and 12 for the final edge. As far as possible, see that all knots come at each end, instead of in the main body of the work. If the count is right, there will now be 90 threads strung around the pegs on this board.

Next get two small strong sticks, each about 12 in. long, and two pieces of string 15 in. long. Run a stick through the openings at the second peg at each end, as shown in Figure 4. Tie the ends of the string to the corresponding ends of the sticks. The yarn may now be removed by pulling the end pegs. Roll the warp on one stick, and fasten the other stick to the burlap on the roller opposite the beater. With someone to hold the warp, turn the roller and wind the yarn in place on the roller. Do not wind entirely up to the beginning stick, but rather leave a couple of feet loose for stringing on the loom. Slip the string off one end of the stick, cut the first 12 threads loose and commence stringing the loom. Thread the warp alternately through the eyes of the heddles, and then through each consecutive dent of the reed. As soon as one group is strung, cut more

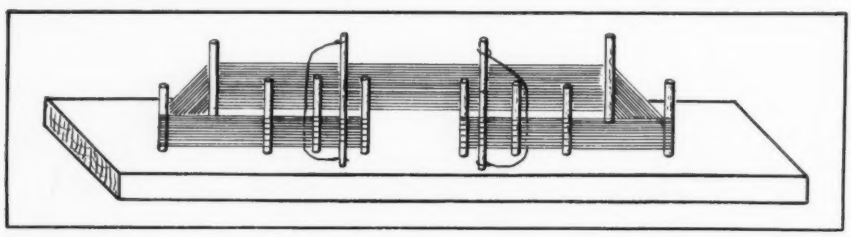


*Fig. 4. To remove warp from the warping board. First run sticks through the warp next to the initial pegs. These sticks should be long enough to hold the full width of warp. Next run a string through next to each second peg and tie ends to the sticks. Finally put out one of the beginning pegs and roll up the warp on the stick at that end. Pull out the other peg and transfer the warp to the loom*

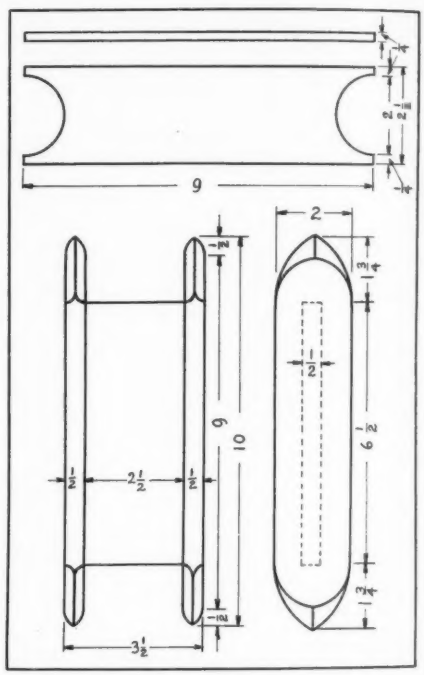



*Fig. 5. Simple shuttles. These easily made shuttles work nicely for weaving on the hand looms. The single thin strip is all that is necessary for the table models, and the heavier shuttle is well adapted for the rugs and heavier weaving*

and continue the process until all the threads are in their correct position. Remember that absolute accuracy is necessary for good work. The ends of the yarn could now be tied to the burlap on the other roller. However, as the warp lies in rather an uneven shape, it would be more satisfactory to work with if it were straightened out, and this can be done at this point. Grasp all of the ends of the yarn and pull gently but evenly through the heddles and reed. Run the entire quantity through and back again upon the beginning roller. The warp should now be found in an even, accurate order; if not, repeat the process until the work is perfect. This method may not be practical when large quantities of yarn have to be warped, but it works nicely for small quantities.

Next, tie the ends of the warp to the burlap on the finishing roller, in small quantities, through holes punched in the burlap. See that the tension is even and that the total width of burlap equals the width of yarn as it comes through the reed.

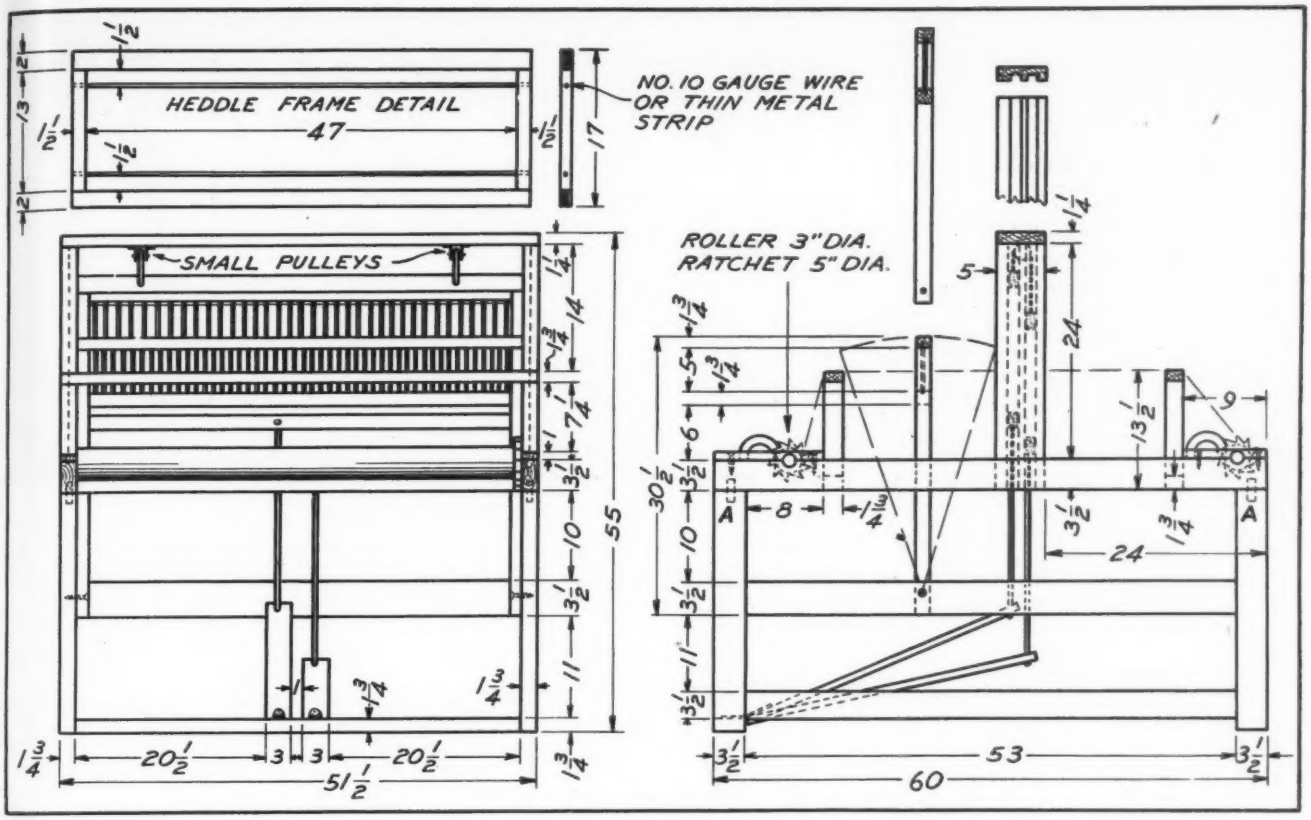



*Fig. 6. Large rug loom*

Make a shuttle, as shown in Figure 5, and commence the weaving. The warp should be rolled to such a position that the first weft threads will come against the knots in the burlap. Depress first one treadle and then the other, thrusting the shuttle through, and beating up well with the reed. It will take two or three weft threads to get the yarn of the warp spread out into position. When once started, the work should go quite easily though keeping the selvage edges even and not too tight is somewhat of a problem. There are many devices designed for this purpose. The simplest thing the writer has found is a thin strip of stiff cardboard and two clothespins of the spring type. Learn to draw the weft yarn just tight enough to make a finished edge and not a drawn ragged line.

It is usually more satisfactory to weave the purse first, and then follow with the scarf. Do all the weaving before taking the work from the loom. Between the purse and the scarf leave enough yarn to make a good fringe for the scarf. When a weft thread runs out, start the new one by a slight overlapping of the ends. Do not tie a knot, as knots show distinctly through the work.

In this simple or tabby weaving, a variety of designs may be planned. Stripes, plaids, and checks are all at the worker's command. Besides other combinations may be used for stringing the loom. In multiple combinations heddles can be strung by two's and three's instead of alternately, and the dents in the reeds skipped or doubled at the desires of the designer. Variegated yarn makes a design in itself and mercerized cotton thread and yarn makes another. Silk stockings make attractive table runners when colored and neatly woven.

Figure 6 shows a large rug loom designed for weaving rugs, dress goods, and other material up to 45 in. wide. This loom is quite compact. It is made to separate at points *AA*. The one shown has but two heddles, but it can be easily designed for four or more by adding more treadles and heddle frames. Any type of joinery may be used except at the points *AA* where loose dowels should be placed.

In cases where large quantities of warp are required, a simple drum like the one shown in Figures 7 and 8 is quite satisfac-

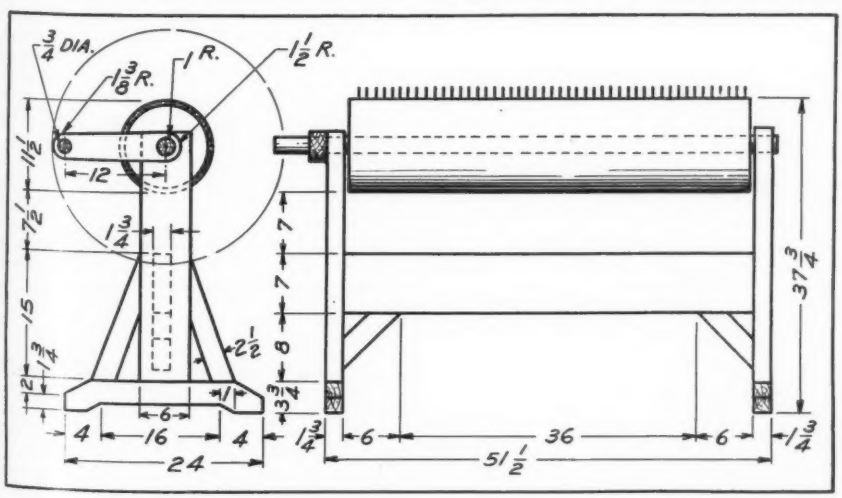



*Fig. 7*

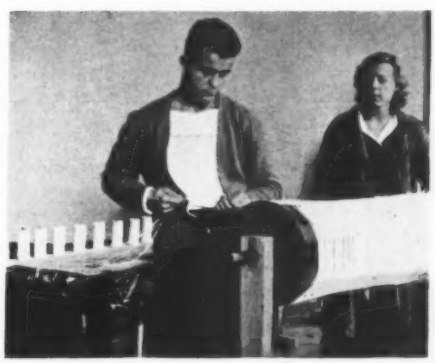


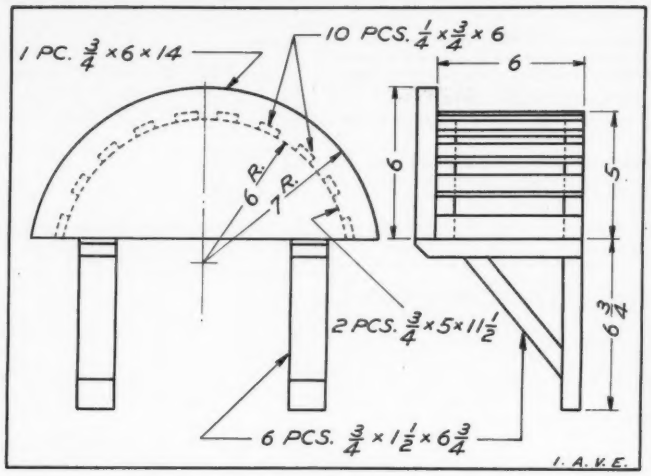
*Fig. 8. Running some warp on the drum*

tory, and much less apt to tangle the warp than the warping board. The diameter of the drum may be made such that each revolution will turn the number of threads needed per inch on the loom, and a very definite grouping can be made. For example, if 12 threads per inch is required, 12 spools of warp would be set up and that number wound in turn to each inch cutting the lengths whenever the yardage is reached. From the drum the work can be directly threaded on the loom.

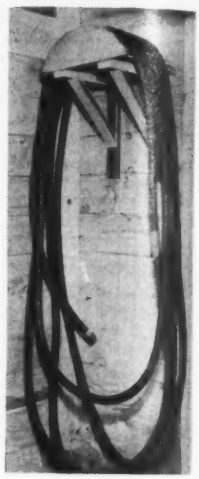
## GARDEN-HOSE RACK

**F. W. Dejmek, Marinette, Wisconsin**

Where and how to hang the garden hose is always a problem to the home owner. A hose should not be hung over a peg or nail which causes the hose to kink sharply. The rack shown in the illustration can be made easily from a few pieces of box lumber. It will add greatly to the life and service of the garden hose. The width of the rack can be varied to serve the amount of hose that needs to be served. The rack can be fastened to the wall in the garage where it will not be in the way and the hose will have a definite place to hang when it is not in use.




*Garden hose rack*



*Machinist jack, designed by Edwin M. Moe and W. H. Bugg, Morton Senior High School, Richmond, Indiana*

## SPANISH CHAIR

**J. I. Sowers, Miami, Florida**

Spanish furniture has four outstanding qualities — *dignity, concentrated interest, vigor,* and *intrinsic sufficiency.* There is enough interest, dignity, and vigor combined in each piece to make it command attention in its own right.

The Moorish element distinguishes all Spanish furniture. The decorative motifs are Arabesque in pattern. The front stretcher of all Spanish chairs is highly decorative. Red and green velvets and full natural leather are used for coverings. Spanish furniture is never upholstered in the sense of being *stuffed.* If a velvet covering is used on the chair shown here a number of pieces of webbing should be stretched across the seat to give support. There is no padding. The seat shown in the drawing is full cowhide. That means that the full thickness of the hide has been used. The hide is dampened, and when wet is stretched firmly across the seat, and tacked on all four sides. Large ornamental brass Spanish tacks are used. The back is of the same material, and stretched and fastened in the same way.

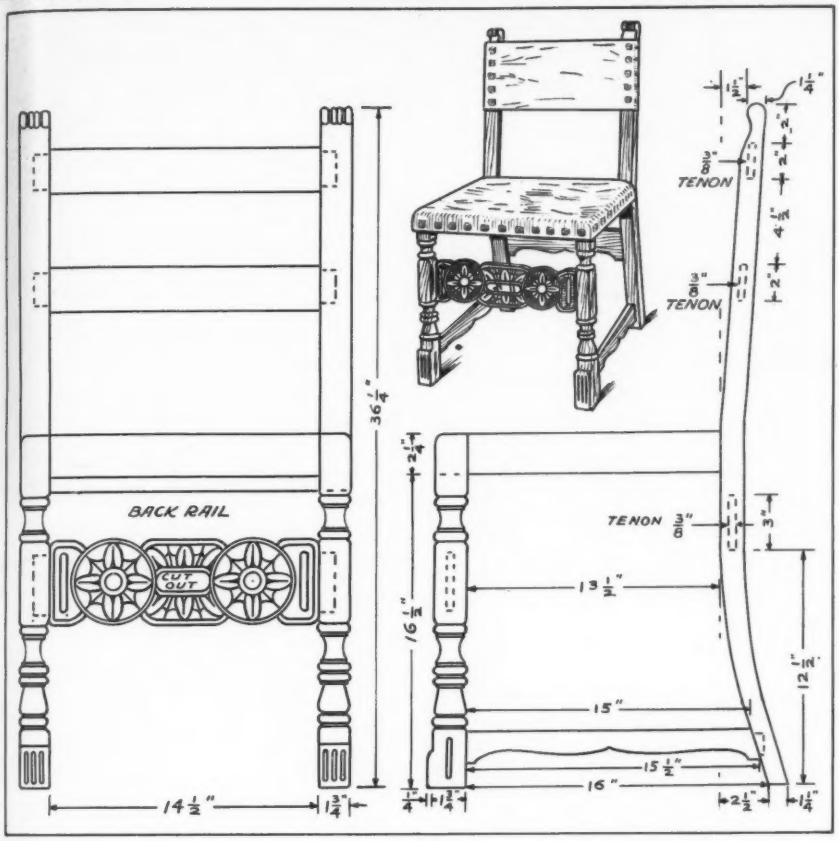
One who has not some skill in wood carving should not undertake to make a Spanish chair, as this is an essential part of the design. A simpler stretcher than that shown in the chair is also given in the drawings for those not so skilled in carving. A little carving is shown on the front leg, and also on the top of the back upright.

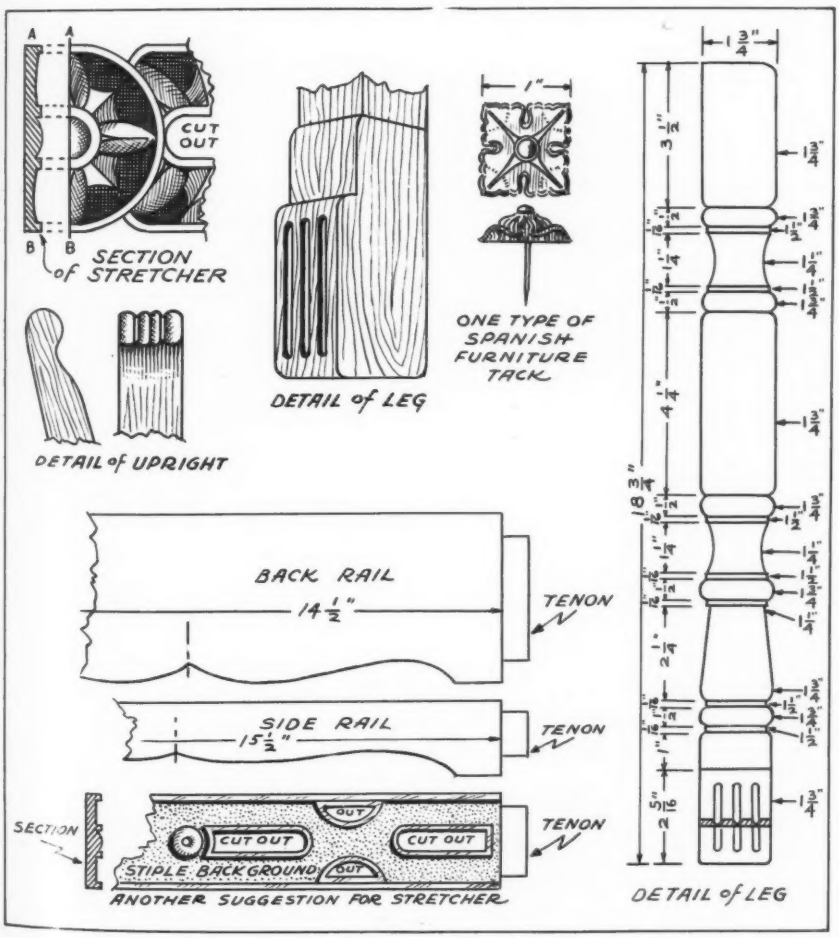
Sometimes the seat of a Spanish chair is made to hang hammocklike from the two sides of the chair, and not fastened in front and back. This makes a comfortable and unusual chair. The leather is, of course, very heavy, and stretched very tightly, and is supported against sagging by many strips of webbing.*

In turning the front leg be sure to make the turning clean and snappy.

Make the chair in oak. Stain Spanish brown. Do not fill the wood. Give a light wash coat of shellac, and polish with wax. Spanish furniture is never given a varnish finish. Seek

*NOTE: A Spanish chair of this kind is shown in *Woodcarving Made Easy,* pp. 55, 56, 58 (Bruce Pub. Company). These chairs will go well with the Spanish tables shown on pages 170 and 171 of the April, 1939, issue of this magazine.




to show the natural effect of the wood, under a soft glow polish.

This chair is designed to show the effects of the Italian Renaissance on Moorish furniture, and dates back to about 1500.

## MORTISE-AND-TENON JOINT—XII

**John E. Doren, High School, Eureka, California**

### The Tenon on Rabbeted Stock

*Case III. Stock Rabbeted on Two Edges ± 1/3 of Its Thickness*

Examples of this case are found in the sash bars and muntins of cut-up sash as illustrated below. The vertical members are commonly called the muntins and the horizontal bars are called sash bars. To illustrate, let us consider sashes made after the simplest detail; rectangular stock with only the glass rabbet. See Figure 105.

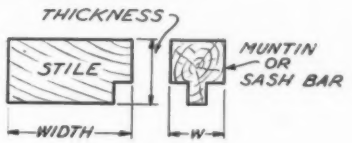



FIG. 105

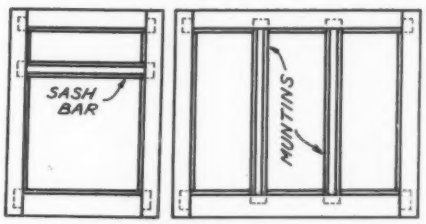



FIG. 106

When muntins or sash bars fit directly against the main members of the sash (rails and stiles respectively), long tenons may be used; tenons as long as those on the main sash rails. There is a purpose for this, for all of the tenons may then be of the same thickness and length, and they may all be cut at one setting of the machines. All mortises also will be of the same width and depth and may all be cut with but slight change in adjustment of the mortising machine, thus conserving time.

Sash material is almost always molded as well as rabbeted, but for the sake of simplicity, the sash material here illustrated is only rabbeted. Tenons on molded material will be considered later.

Figure 108 shows the mortise and tenon in their relation to each other and to the rabbets on the respective members.

Notice that the thickness of the sash bar is the same as the thickness of the stile, but the thickness of a sash bar may be greater than its width as shown in Figure 109.

Notice that the length of the tenon (1) is measured from the end of the tenon to the nearest shoulder; also, that the width of the tenon (w) is equal to the width of the sash bar (W).

Until one is thoroughly familiar with the application of the mortise-and-tenon joint to sash and panel work, it is good practice to make a drawing of the sash or panel frame to exact scale on detail paper, or a full-size layout on a rod, showing all of the essential

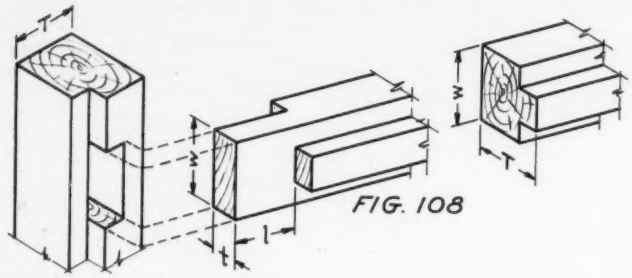



FIG. 108

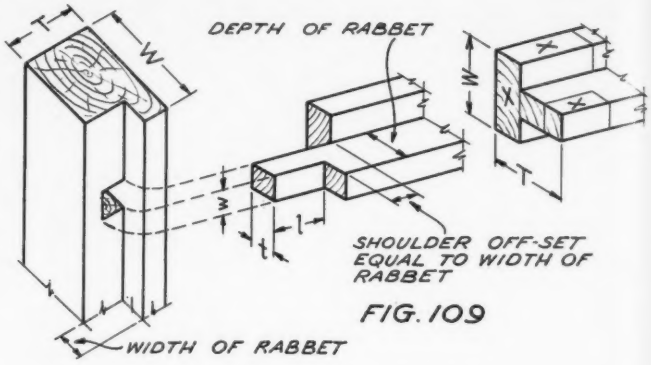



FIG. 109

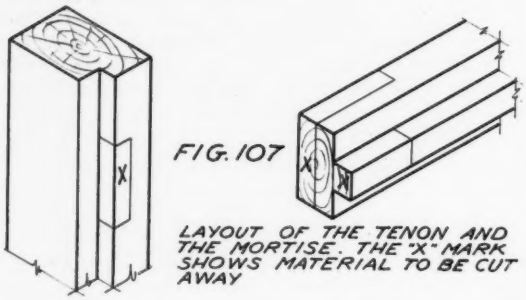
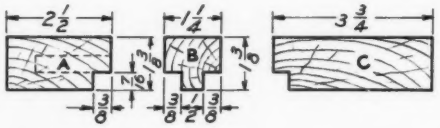



FIG. 107

LAYOUT OF THE TENON AND THE MORTISE. THE "X" MARK SHOWS MATERIAL TO BE CUT AWAY



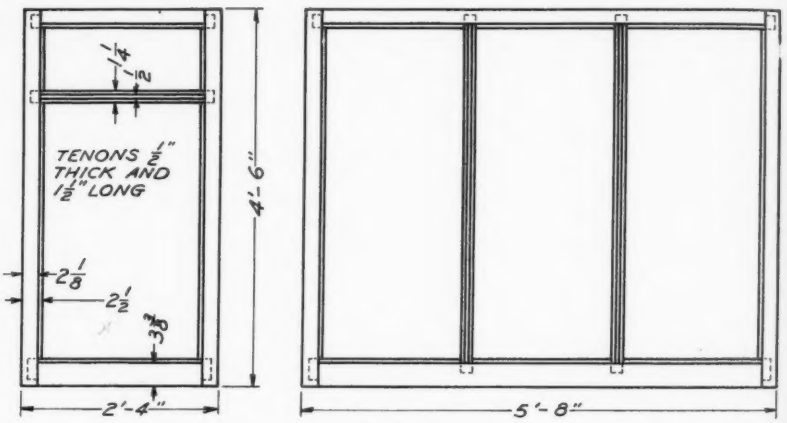




FIG. 110

details of the joints before preparing the cutting bill. Study Figure 110 as an example of the type of sketch suggested from which to prepare the cutting bill.

The time spent in writing out a complete cutting bill is time well spent; it helps to fix the details of the work more clearly in the mind. At the top of the cutting bill there should be a heading stating the over-all finished dimensions of the sash or frame; if other sashes or frames of different sizes are listed on the same cutting bill, there should be a similar heading just above the group of items that go to make up the sashes or frames. The items as listed should be the exact finished dimensions that should obtain at the point of assembly. Study the cutting bill listing the parts of the small sash shown in Figure 110. Notice the length of the rails and sash bar; these members terminate in blind tenons and no overlength is permissible or the sash would be too wide, but the length of the stiles is 1 in. longer than the finished sash. This overlength on the stiles must be taken into account when the mortises are laid out and cut. Study the cutting bill and the illustration of the sash and take particular notice of the *remarks* that describe the tenons on the top and bottom rails and also those on the sash bar. It is also good practice to draw a sketch on the cutting bill showing the details of the rabbet on the various members. If only a crude sketch is made of the section of the pieces, figures should indicate the size of the rabbet or a full-size detail should be at hand for reference. Plain common sense should be used when entering the *notes* or *remarks* on the cutting bill to make all things plain and. so far as is possible, eliminate the chances for any misunderstanding.

*(To be continued)*

One Sash - Casement $1\frac{3}{8}$" × 2'-4" × 4'-6"

CUTTING BILL OF EXACT SIZES AT POINT OF ASSEMBLING

| ITEM | NAME OF PART | P | T | W | L FEET | L INCHES | MATERIAL | REMARKS |
|---|---|---|---|---|---|---|---|---|
| 1 | Top Rail | 1 | $1\frac{3}{8}$ | $2\frac{1}{2}$ | 2 | $2\frac{3}{4}$ | Redwood | Tenon 2 ends $\frac{1}{2}$ × $1\frac{3}{4}$" × $1\frac{1}{2}$" Relished + Recessed |
| 2 | | | | | | | | Shoulders off-set $\frac{3}{8}$" - Rails Rabbeted 1 edge $\frac{3}{8}$" wide × |
| 3 | | | | | | | | $\frac{1}{2}$" deep - See detail |
| 4 | Bottom Rail | 1 | $1\frac{3}{8}$ | $3\frac{3}{4}$ | 2 | $2\frac{3}{4}$ | Redwood | Tenon 2 ends $\frac{1}{2}$" × 3" × $1\frac{1}{2}$" Relished + Recessed - Shoulders |
| 5 | | | | | | | | off-set $\frac{3}{8}$" Rabbet $\frac{3}{8}$" wide × $\frac{1}{2}$" deep - See detail |
| 6 | | | | | | | | |
| 7 | Sash Bar | 1 | $1\frac{3}{8}$ | $1\frac{1}{4}$ | 2 | $2\frac{3}{4}$ | Redwood | Tenon 2 ends $\frac{1}{2}$" × $1\frac{1}{2}$" × $1\frac{1}{2}$" Shoulders off-set $\frac{3}{8}$" |
| 8 | | | | | | | | Rabbet 2 edges See detail |
| 9 | | | | | | | | |
| 10 | Stiles | 2 | $1\frac{3}{8}$ | $2\frac{1}{2}$ | 4 | 7 | Redwood | Mortise to detail - $\frac{1}{2}$" chisel $1\frac{5}{8}$" deep |
| 11 | | | | | | | | Rabbet 1 edge in pairs - See detail |
| 12 | | | | | | | | |
| 13 | | | | | | | 1 Stationary Sash | $1\frac{3}{8}$" × 5'-8" × 4'-6" |
| 14 | Top Rail | 1 | $1\frac{3}{8}$ | $2\frac{1}{2}$ | 5 | $6\frac{3}{4}$ | Redwood | Tenon 2 ends $\frac{1}{2}$" × $1\frac{3}{4}$" × $1\frac{1}{2}$" Relish - See detail |
| 15 | Bot. Rail | 1 | $1\frac{3}{8}$ | $3\frac{3}{4}$ | 5 | $6\frac{3}{4}$ | " | Tenon 2 ends $\frac{1}{2}$" × 3" × $1\frac{1}{2}$" Relish - See detail |
| 16 | Muntins | 2 | $1\frac{3}{8}$ | $1\frac{1}{4}$ | 4 | $0\frac{1}{2}$ | " | Tenon 2 ends $\frac{1}{2}$" × $1\frac{1}{4}$" × $1\frac{1}{2}$" - See detail |
| 17 | Stiles | 2 | $1\frac{3}{8}$ | $2\frac{1}{2}$ | 4 | 7 | " | Mortise to detail - Rabbet Left + Right |
| 18 | | | | | | | | |
| 19 | | | | | | | | |
| 20 | | | | | | | | |
| 21 | | | | | | | | |

*Cutting bill*

♦ The National Occupational Conference expects to conclude its activities and disband its organization by September 30, 1939. By that time the Carnegie Corporation grant for preparation and publication of the occupational abstracts will be almost exhausted. In order that the present abstracts may be kept in print as long as possible, and in the hope that the abstract program may be continued on a self-supporting basis, the National Occupational Conference has asked Occupational Index, Inc., to be responsible for the future distribution of abstracts and self-support explorations.

In order to meet actual costs, it has been necessary to increase the price to fifteen cents in quantities of ten or more. Single copies are twenty-five cents, cash with order.

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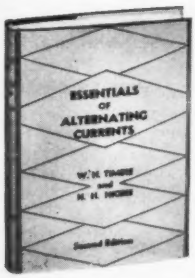


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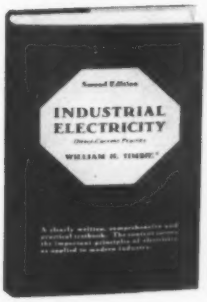


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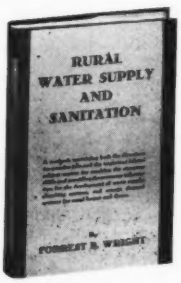
—JOHN C. DONOHUE, *Principal, Blodgett Vocational High School, Syracuse, N. Y.*

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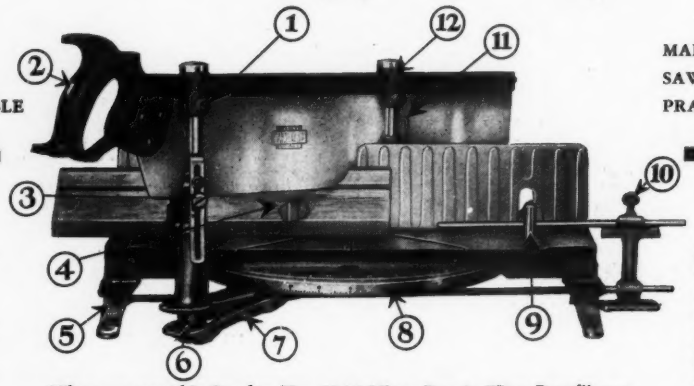


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# Personal News

### J. W. Paul Dies

J. W. Paul, Assistant State Supervisor of Trade and Industrial Education for Kansas, died Wednesday morning, September 13, in a Marysville, Kans., hospital as the result of injuries received in a car accident near Marysville, September 12.

*J. W. Paul*

Mr. Paul was born on October 6, 1882, at Havana, Ill. He was a graduate of the Bradley Polytechnic Institute, Peoria, Ill. While teaching in the Wells Manual Training School at Watseka, Ill., he married Miss Jessie Colby, who also attended Bradley Polytechnic Institute.

Mr. Paul had been assistant supervisor for Kansas since August 15, 1937. Previous to that time he had a similar position for 11 years with the Illinois State Board for Vocational Education at Springfield.

Survivors include, beside his wife, a son, Robert Joseph of Cincinnati, Ohio; a brother, Carl of Muskogee, Okla.; and a sister, Katherine of Illinois.

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♦ Dr. James E. Wert has been appointed professor of vocational education at Iowa State College, Ames, Iowa.

He received his B.A. degree from Adrian College, Adrian, Mich., in 1915. He was awarded the degrees of M.A. and Ph.D. from Ohio State University, Columbus, Ohio.

From 1920 to 1923 he was superintendent of public schools at Utica, Ohio. He taught statistics at Ohio State University from 1933 to 1937. He will leave his present position at State Teachers College, Tempe, Ariz., to assume his duties at Iowa State College on January 1, 1940.

♦ Recently, Glen DeLay, superintendent of schools at Neodesha, Kans., was appointed a member of the State Board of Education. This also makes him a member of the State Board of Vocational Education of Kansas.

♦ Merritt W. Haynes, of Cranford, N. J., former principal of the Bayonne Vocational School and one-time head of the education department of the American Type Founders Company, has been employed by the Board of Education of Elizabeth, N. J., to make a study of occupational opportunities in the Elizabeth industrial area and of curriculum offerings in the Edison Vocational School. The appointment is for the school year which began September 1.

♦ Lowell L. Carver, formerly of Kenosha, Wis., has been appointed as instructor of industrial-arts education at Iowa State College, Ames, Iowa. He received his M.S. degree from this same university.

♦ Dewey F. Barich, formerly at the high school in Trenton, Mich., has been appointed to the staff of Central State Teachers College, Mount Pleasant, Mich. He will be supervisor of student teaching, and teacher trainer in general-shop work, home, and farm mechanics.

♦ Harry W. Kroll has been appointed Vocational Placement Director of the school system at Rockford, Ill. It will be his duty to develop a placement program for the students of the various trade and commercial courses.

♦ Dr. Thomas A. Hippaka was a member of the summer-school faculty at Stout Institute during the past summer. This has been his third summer-school assignment at this school. He has held similar positions for two summers at the University of Wisconsin, Madison, Wis., and for four summers at Oswego State Teachers College, Oswego, N. Y.

He has two years' practical experience in the building trades and one year at millwrighting.

He also taught vocational subjects in the evening school at Fond du Lac during the school years, 1918 to 1921.

♦ Donald L. Ritchie, formerly with the Rochester Museum of Arts and Sciences, has been added to the faculty of the Rochester Athenaeum and Mechanics Institute, Rochester, N. Y., as presswork instructor.

♦ C. L. Wetzel taught a three weeks' course of "Analysis of Learning Difficulties" during the summer session at Colorado State College, Fort Collins, Colo., and a three weeks' course on "Adult Education" at Stout Institute, Menomonie, Wis.

♦ C. R. Lindstrom, formerly an instructor at State Teachers College, Peru, Nebr., has enrolled in the Graduate School of New York University with a Fellowship in Safety Education.

♦ Charles P. Richardson has been appointed director of vocational education of the southern branch of the University of Idaho, Pocatello, Ida.

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# Association News

♦ The twenty-second annual convention of the New Jersey Vocational and Arts Association was attended by more than twelve hundred people. It was most gratifying that more school superintendents, principals, and other executives are joining each year.

Besides the well-prepared programs of the various groups, the exhibits, both educational and commercial, were unusually good. The several dinners and luncheons as well as many smaller parties added much to the sociability of the convention.

The program prepared by Mr. McCarthy for the Thursday evening meeting was snappy and to the point.

Dr. Edwin A. Lee, Teachers College, Columbia University, said that in the industrial-arts and vocational fields the application of design and color has to be made to something which has utility and is structurally correct. It is the power of expression acquired by the mastery of craftsmanship, which enables one to create a masterpiece.

The annual Friday noon Vocational Luncheon was sponsored by the Middlesex County Vocational Teachers' Association and was largely attended. Paul H. Hunter presided.

An unusually interesting and instructive program was presented by the Industrial Arts Supervisors' group under the chairmanship of Earl Brown. Professor Paul B. Eaton, Head of the Engineering Department of Lafayette College, spoke on "What Special Technical and Personal Characteristics the Colleges Desire in the Product from the Secondary Schools." Among the criticisms made by colleges of the high-school product, Professor Eaton mentioned the following: the lack of ability to read and write English cogently; lack of ability to concentrate; inability to understand and follow directions; lack of power of observation; lack in training in the arrangement of subject matter. There is a noticeable lack of training in fundamentals, especially in mechanical drawing and mathematics. Remedies for these weaknesses were suggested by the speaker but lack of space prevents more complete details.

J. T. Rea presented a paper on the needs of industry. This talk was so instructive that copies were requested by many listeners.

Friday afternoon at three o'clock the second General Meeting was held in the Crystal Room at which time Miss Berry, President of the Association, presided and presented a representative of the Mayor of Asbury Park, who welcomed the convention to the city. The speaker was Mr. L. H. Dennis, Executive Secretary of the American Vocational Association, who spoke on current legislation on educational matters.

The annual banquet was held in the Crystal Room of the Berkley-Carteret Hotel at seven o'clock Friday evening.

Dr. Charles H. Elliott, Commissioner of Education was unable to be present but he sent his greetings by Mr. McCarthy who assured the Association of Dr. Elliott's keen interest in the fine and vocational arts. Dr. William Fidler, President of the New Jersey Educational Association, brought greetings from that group and commended the officers and members of the Vocational and Arts Association on their splendid organization and excellent convention.

Dr. Ronald Kent introduced the speaker of the evening, Dr. Emil Lengyl, author, traveler, journalist, and lecturer on European affairs who spoke intimately on affairs in Europe. He contrasted the freedom of education in the United States with the repression of youth in Italy and Germany.

Saturday forenoon was devoted to programs by sectional groups.

The Industrial Arts Section was in charge of William M. Devonald, who for the general topic chose "Enriching Industrial Arts Teaching with Visual Aids."

The first speaker on the program was Dr. Lawrence R. Winchell, Superintendent of Schools, Vineland, N. J., whose work in the field of Visual Education has created much attention in this and other states. He feels that the motion picture is superior to the lantern slide as an aid in teaching, but that both are exceedingly valuable in stimulating interest. As a conclusion to a very interesting address, Dr. Winchell showed a film entitled "A Trip through the Industrial Arts Department of Vineland High School."

Dr. F. Dean McClusky, Director Scarborough School, Scarborough-on-Hudson, N. Y., also gave a very convincing address dealing with the value of motion pictures and lantern slides as an aid to the industrial-arts teacher. Dr. McClusky is of the opinion that these aids are better suited to the shop and classroom than the auditorium where in a large assembly pupils are apt to compare them with the "movies."

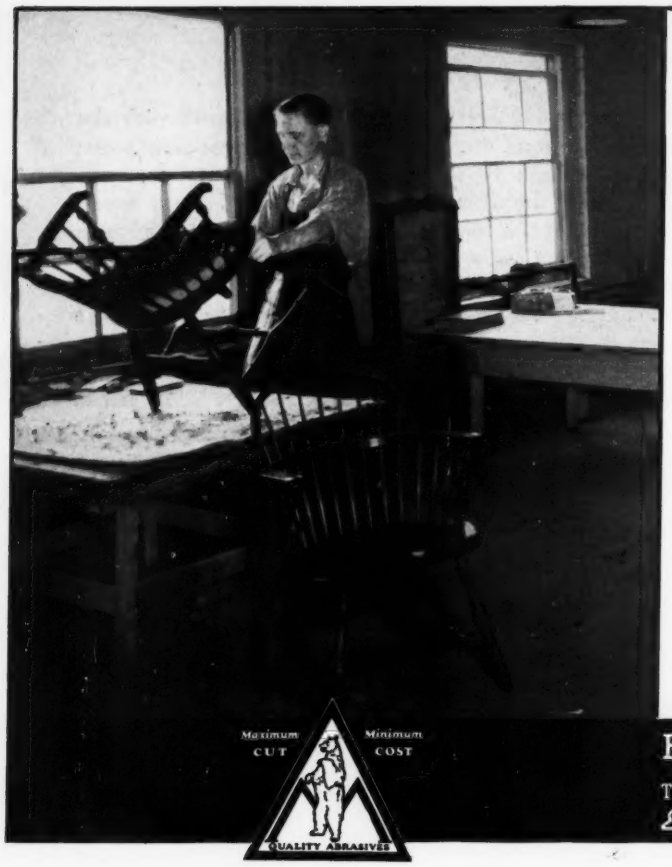
Mr. Fred M. Richmond, Department of Industrial Arts, State Teachers College, Newark, N. J., took for his topic "Shop-made Visual Aids for Better Industrial Arts Instruction." In a very practical demonstration he showed how various types of effective lantern slides can be made by the shopman at a very small cost.

The Printing Section upheld their reputation of presenting one of the most original and interesting programs of the convention. Ernest De Wick of Rahway presided and presented the speakers as scheduled. Following these speakers an open forum was conducted by Russell Rubrecht. Discussion topics were assigned to all present. As names were drawn, the topics were discussed. Whoever was on the floor at the time an automatic gong sounded received a prize. Not only were the topics very timely and instructive, but the discussions were spirited. It goes without saying that there was a lot of fun. The usual large delegation from New York was present. Respects were paid Mr. John Black, formerly of the Boys' Vocational School, Newark, who died a short time ago.

The Boys' Vocational and Guidance Sections were well attended and presented their programs as scheduled.

The following officers were elected for the next year: President, Harold D. Shannon, Asbury

(Continued on page 14A)



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(Continued from page 13A)

Park; First Vice-president, Ronald W. Kent, Newark; Second Vice-president, Eunice Harrison, South River; Third Vice-president, James E. Hopkins, Maplewood; Treasurer, Frank R. Flower, Atlantic City; and Secretary, J. J. Berilla, Phillipsburg.

♦ The industrial-arts section held in connection with the forty-eighth annual convention of the Minnesota Education Association (southwestern division), will meet on Thursday, October 19, at 1:30 p.m. in the Mankato High School. Mr. Lawrence Picha, Kenyon, will preside.

Mr. Emil Ludtke, industrial-arts instructor of Mountain Lake will give a demonstration on ring casting and making an electric-welding outfit.

Mr. Robert Ryan, co-ordinator of Faribault will speak on "Vocational Education in the Small Community."

Mr. Gordon Voss, state supervisor of trade and industrial education, St. Paul, has chosen for his subject, "Industrial Arts in Minnesota."

Mr. John J. Metz, Editor of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION, Milwaukee, Wis., will speak on "Looking Ahead in Industrial Arts."

There will also be an exhibit of industrial-arts projects at the State Teachers College. Mr. Morris J. Nelson will be in charge of this exhibit.

♦ The New England Industrial Arts Teachers Association convention will be held November 3 and 4, 1939. The program will begin at 9 a.m., Friday, November 3, at the Falmouth Hotel, Portland, Me.

♦ The September meeting of the Fairfield County Industrial Arts Association took place at Greenwich, Conn.

Following the dinner prepared and served by the domestic-science department of Greenwich Senior High School, and the entertainment furnished by the Greenwich Board of Recreation, Dr. Paul N. Wenger presented Dr. Roland S. Spaulding, professor of education and aviation at New York University, who chose for his subject "Aviation — Its Potentialities and Actualities." He pointed out that aviation has a great distance to travel before it duplicates the phenomenal growth of the auto industry.

Airplanes may be divided into three classes, those in use, which are rapidly approaching obsolescence; those in the experimental stage which will eventually replace those now in use; and those on the drafting board, which in turn will antiquate those now being experimented upon.

Dr. Spaulding expressed the thought that aviation courses in secondary schools were training more mechanics than could be absorbed unless there be a rapid expansion in the aircraft industry. He thought, however, that there is a dearth of competent teachers in this field.

On the invitation of Dr. Raymond Phipps, the November meeting of the association will be held at the New Britain Teachers College, New Britain, Conn. — *Edward P. Stach.*

*Remember the Annual Membership Roll Call, November 11–30, 1939*

# New Publications

**Operation and Maintenance of the Line-Composing and Line-Casting Machine**
By Joseph F. Sorace. Paper, 265 pages, 6 by 9, illustrated. Printed by the Rochester Athenaeum and Mechanics Institute, Rochester, N. Y.

This well-illustrated and clearly written textbook for the advanced students in the print shop is divided into 104 lessons which cover the history of the line-casting machines, directions to the learner in acquiring facility in the use and operation of these machines, information on finding and removing troubles, and directions for making adjustments.

Each lesson is accompanied by a number of questions for discussion or review. There are also references for supplementary reading.

**Information and Operation Units in Machine Woodworking**
By Robert E. Smith. Paper, 159 pages, 8 by 10¾, illustrated. Price, 84 cents. Published by the McCormick-Mathers Co., Wichita, Kans.

A usable set of instruction sheets for the woodworking shop. The material is divided into nine sections devoted to the following: Equipment and processes; power and hand grinders, and grinding processes; the circular saw and sawing operations; band and jig saws; jointers and jointer operations; planers and planing operations; mortising machines and mortising; shapers, routers, and shaping and routing operations; power sanders and sanding operations.

(Continued on page 16A)

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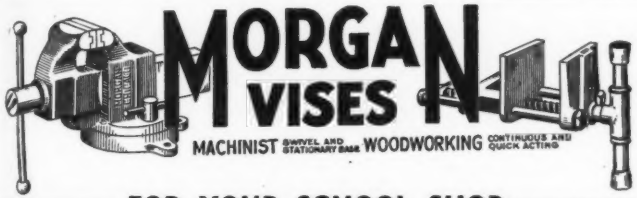

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A few of the items we show: Chest hardware, locks, hinges, supports, casters, copper trim, etc., also midgs., overlays, etc. Finishing materials, glue, stains, varnish, wax, flint and garnet papers, rubber sanding blocks, stick shellac, burning-in knives, etc. Upholstering supplies and coverings. Complete line of electrical findings for lamp manufacture, also cluster and indirect fixtures. Chair cane, woven and in strands, spline, reeds, fibre cord, etc. Trays for smoking stands and glass liners. Large line electric and spring clock movements, with and without dials. Complete line Venetian Blind hardware, tapes and cords. Table slides and leaf supports. Tea wagon wheels and casters. Wood dowels, also dowel screws, dowel centers, wood screw hole buttons. Excellent line card table leg supports. Bed hardware of every description. Desk pens, complete with funnel and fastening, without base. Water transfers, inlays, small mouldings, etc. Furniture glides and casters, office chair spiders, wood legs and K. D. chair frames. Small box hardware of every description. Large selection pulls, knobs, handles, hinges, locks, catches, etc. Perforated steel panels, chair braces, revolving chair fixtures, rocker springs, candlestick sockets, bill board clamps, banquet table equipment, many sizes braces, corner irons, hanger bolts. Step ladder braces, pilaster strips, sliding track and sheaves. Typewriter desk hardware, binswings, mirrors, nut bowl hardware. Bar pins for novelties. Catalin Plastics. Crib hardware, swivel top table fixtures, sectional bookcase hardware, clamp nails, electric pens for burning, etc., etc.

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## UNIFORM . . . QUICK ACTING

*Sold in 1, 5, & 20lb. spools and in small household packages*

**Used by industrial plants and mechanics everywhere . . . Gardiner Flux-Filled Solder assures permanent bonds. Saves both time and material because easy to use and always of uniform high quality. Unparalled production methods keep costs below that of even ordinary solder. Sold by hardware and mill supply dealers. A generous free sample will be sent to instructors upon request.**

**We also make a complete line of babbitts, casting metals, and bar and solid wire solder.**

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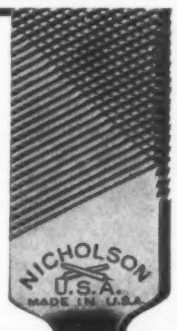
## Fast! Accurate!

Controlled Serrations,* an exclusive Nicholson feature, means quick results when your students have a fast metal-removing job to do.

Controlled Serrations* mean more accurate filing, too! Nicholson Files hold to the line of work better and push easier—make filing easier for your students.

Let your students learn with Nicholson Files — the favorites of Industry. Nicholson File Company, Providence, Rhode Island, U. S. A.

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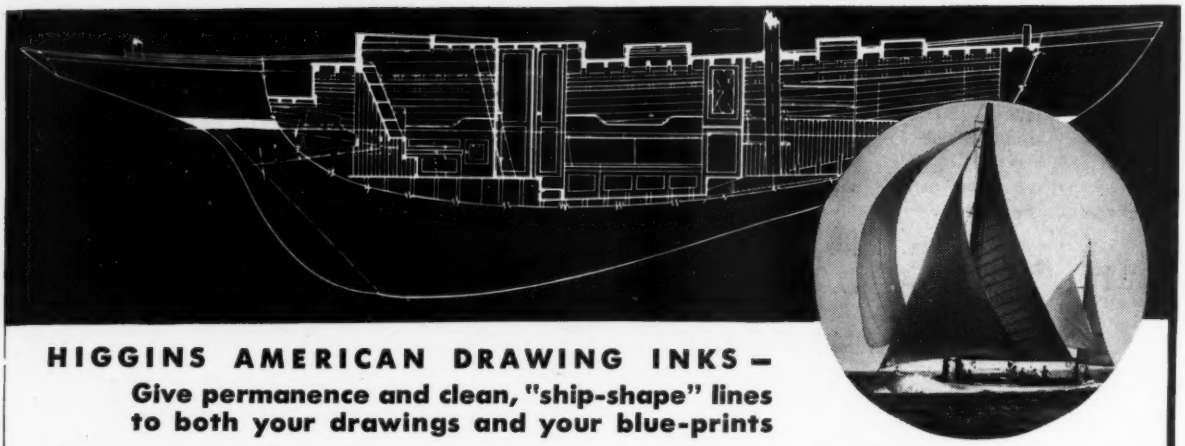
**NICHOLSON FILE COMPANY**
PIONEERS IN QUALITY PRODUCTION

75th ANNIVERSARY YEAR



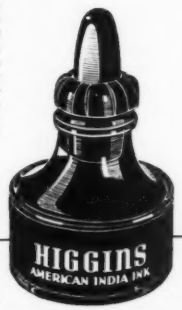
**HIGGINS AMERICAN DRAWING INKS —**

**Give permanence and clean, "ship-shape" lines to both your drawings and your blue-prints**

Higgins American Drawing Inks, too, have that "winning" quality which makes them the first choice of designers, architects, engineers, draftsmen, artists — all whose creative ideas first take shape in ink on paper. Higgins Waterproof Black Drawing Ink flows freely and evenly. Its even flow gives you a uniformly "clean," sharp line which results in clear, sharp blue-prints and perfect photographic and photo-engraving reproduction. Constant handling never smudges the original. Neither weather, light nor temperature fades the permanent brilliance of this jet-black ink which has been bought 'round the world for more than 50 years.

In addition to the waterproof and soluble blacks, Higgins American Drawing Inks come in 17 lucid waterproof colors, white and neutral tint. Specify Higgins on your next order — and ask your dealer for one of the new Higgins Color Wheels showing Higgins Inks actually applied on drawing paper.

*"Stormy Weather," sailed by her owner, Robert W. Johnson — won the Miami-Nassau Race this year for the third time. This famous ocean racing yaud was designed by the well-known firm of Sparkman and Stephens, Inc., Naval Architects.*




**HIGGINS** CHAS. M. HIGGINS & CO., INC. · 271 NINTH STREET, BROOKLYN, N. Y.

(Continued from page 14A)

The appendix contains a number of commonly used measures and formulas.

**A Marblehead Model Sailing Yacht**

By Claude W. Horst. Paper, 39 pages, 8¾ by 11¾, illustrated. Price, 50 cents.

This description of the favorite 50-in. model carrying 800 sq. in. of sail is quite complete. The method of developing the lift templates and the cutting and gluing up of the lifts is well illustrated and clearly described. Full-sized station templates are given to assist the worker in getting an accurately shaped hull.

Concise directions also are given for casting the lead keel and detailed sketches make plain how the deck fittings, masts, and sails are made.

The booklet also contains a chapter on "Sailing Technique."

**The Development of Power**

By Eugene C. Wittick. Paper, 162 pages, 6 by 9, illustrated. Price, $1. Published by the University of Chicago Press, Chicago, Ill.

A fine book of related materials which may be used with shop subjects as well as with social-science classes.

It is divided into six chapters, the first of which is on wind power, the second on water power, the third on steam, the fourth on internal-combustion power generators, the fifth on electrical power, and the sixth on power transmission.

The book is interestingly written and well illustrated. The appendix contains several useful tables.

**New Ideas in Woodcraft**

By John T. Lemos. Cloth, 80 pages, 7 by 10⅛, illustrated. Price, $2. Published by Bridgman Publishers, Inc., Pelham, N. Y.

A collection of simple projects in woodwork which may be readily made by anyone. Few tools are required to produce the articles shown and many methods of decorating the finished pieces are described.

**A Portfolio of Alphabet Designs**

By Irene K. Ames. 10 by 15 portfolio. 32 — 9¾ by 14½ plates. Price, $2.50. Published by John Wiley and Sons, Inc., New York City.

A series of plates presenting recent tendencies in the design of alphabets including historic examples that serve as a basis for modern forms.

The series was designed for artists, architects, designers, and craftsmen.

# News Notes

♦ The U. S. Civil Service Commission announces open competitive examinations for the positions of chief engineering draftsman, $2,600 a year; principal engineering draftsman, $2,300 a year; senior engineering draftsman, $2,000 a year; engineering draftsman, $1,800 a year; and assistant engineering draftsman, $1,620 a year for work on ships.

File applications at once with U. S. Civil Service Commission, Washington, D. C.

♦ In cooperation with the Glenn L. Martin Company, the Baltimore Public School Placement Bureau chose sixty high-school graduates for an intensive twelve-week training course under the guidance of two instructors from the Baltimore Vocational High School and one from the Martin organization. These boys were put to work at the Martin plant, and the classes maintain a strictly business, 5-day, 8-hour schedule, with students punching a time clock as in standard factory practice. Tools and materials for the course are loaned by the aircraft company but no work produced at the school will be used in actual planes. Operating procedure for the course was formulated in a series of conferences between school executives and Martin factory officials. At the completion of the course successful graduates were eligible for employment in the Martin plant.

♦ On September 11, 27 students from six states of the Union entered the freshman class in the department of publishing and printing of the Rochester Athenaeum and Mechanics Institute, Rochester, N. Y. Last year's entering class numbered 18.

♦ Experts of the department of publishing and printing at the Rochester Athenaeum and Mechanics Institute, Rochester, N. Y., during the present school year will address the student body in the various fields of publishing and printing. The schedule follows:

*Layout:* Paul A. Bennett, Mergenthaler Linotype Co., September 18.

*Composing Room:* William A. Duboc, Hamilton Mfg. Co., October 16.

*Gravure:* Alfred M. Geis, Alco Gravure, Div. of Publication Corp., November 20.

*Platemaking:* Film slides and local speakers, December 18.

*Printing Education:* John A. Backus and others, American Type Founders Sales Corp., January 15.

*Offset:* J. F. Webendorfer, February 19 (tentative).

*Paper:* Frank E. Wagner, S. D. Waren Co., March 18.

*Management:* Local speakers, April 15.

*Pressroom:* Roy Kirby, American Type Founders Sales Corp., May 20.

# New Products

**Edco "Spee-Dee" Lettering Set**

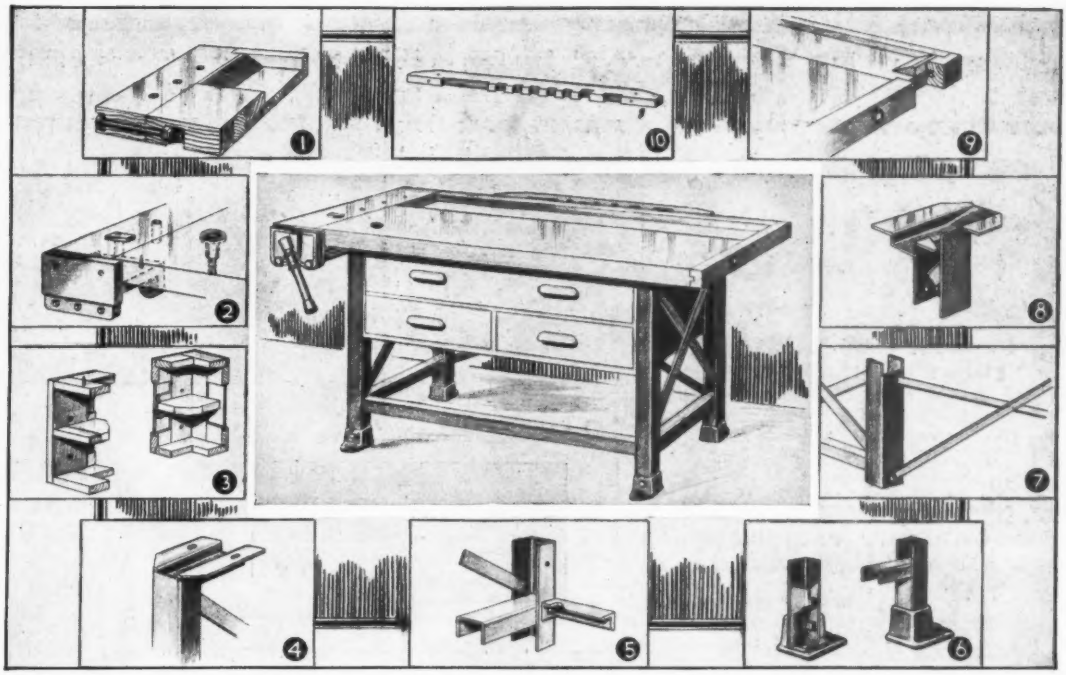
A fast, accurate, versatile, and economical lettering set has just been announced by the Eugene Dietzgen Co., manufacturers of drafting and surveying supplies, Chicago, Ill. The outstanding feature of the Edco "SPEE-DEE"

# The Manual Training Bench That Stands Up.

**Hamilton Steel Manual Training Benches stand up under abuse. Strong and sturdy steel construction with the ten unique features shown in the illustration insure that your Hamilton tables will last longer and wear better.**

**Send in the coupon for our complete catalog describing in detail how Hamilton Manual Training Benches can solve your equipment problems.**

**Hamilton Mfg. Co.**
Two Rivers, Wis.



**HAMILTON**
*Laboratory and Vocational Furniture*

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**HAMILTON MFG. CO., Two Rivers, Wis.**

Send a copy of your new vocational catalog to:

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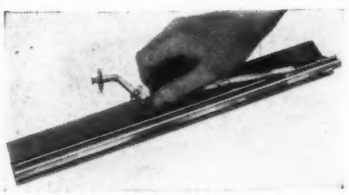
lettering set, is that with one single guide it is possible to produce eight different types of lettering, simply by changing the setting of the tracer and the pen arm. Each lettering outfit has six different weights of pen points from extra light to extra bold, thus making 48 different weights and styles of type available. Letters are



*Edco "Spee-Dee" lettering set*

formed in one continuous movement without shifting the guide, because each character on the guide is complete and in alphabetical order. Each guide has upper- and lower-case letters, numerals, and characters. Proper positioning and spacing of letters are made easy by the spacing markers. The guide is precision built of special, durable plastic material. The outfit is packed in a portable mahogany case, complete with all supplies.

Drafting departments find that the Edco "SPEE-DEE" Lettering Outfit increases output greatly, with more uniform results and reduced costs.

### Heavy-Duty Super Regals

Two new big Super Regals, 21- and 24-in. heavy duty, are now available in addition to the regular 10-in. Regal, and 13-, 15-, 17-, and 19-in. Super Regal models.

LeBlond Regals for more than a score of years have been used by leading industrial vocational schools to provide realistic lathe training for youngsters. Regals, because they are in effect small-scale models of the big lathes of industry, offer exceedingly practical apprentice training.

In 1938 one hundred and eighty-seven vocational schools maintained batteries of LeBlond Regals for training apprentices. Now 204 schools standardize on Regals.

The addition of the 21- and 24-in. Super Regals now provides still a greater variety and range of training. Some of the features of the new Super Regals are:

Eight spindle speeds obtained through sliding gears. The final drive is through helical gears which provide a powerfully smooth drive to the spindle.

The lead screw and feed rod are built into every Regal.

Direct motor control or multiple-disk clutch and brake are furnished on the 21- and 24-in. Super Regal lathes to facilitate frequent and rapid starting and stopping. Single-point adjustment permits adjustment of the plates to as little as .003 in. This feature provides maximum capacity with minimum pressure on the operating lever.

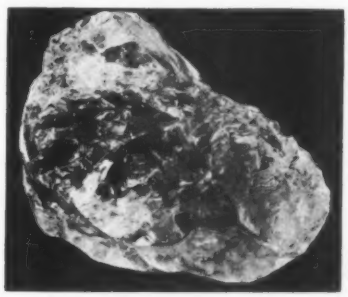
The speed selector built into the headstock of the 21- and 24-in. Super Regals, show cutting speeds for all commonly machined materials, indicating the proper r.p.m. to be used.

Special bulletins for each of the seven sizes of Regals may be secured from the R. K. LeBlond Machine Tool Co., Cincinnati, Ohio. The writer should mention the sizes of lathe in which he is interested.

### Synthetic Solid Produces Unusual Tracing Paper

A tracing paper combining the transparency of oil-treated sheets with the permanence of natural 100 per cent rag papers, is a recent development of the Keuffel & Esser Company, of Hoboken, N. J. The new paper is named Albanene. It is made of 100-per-cent long fiber, clean white rags, and it is treated with a new crystal clear synthetic solid called Albanite, developed in the Keuffel & Esser laboratories. Because this new transparentizing agent is free from oil and wax, and both chemically and physically inert, Albanene will not oxidize, turn yellow, become brittle, or lose transparency with age.

According to the manufacturer, the new chemical has remarkable penetrating power so that an extremely long fiber base paper can be used, giving Albanene an unusually high strength factor by all standard paper tests. The ability of Albanite to penetrate "wild" fibers gives Albanene unprecedented transparency and superior blueprinting quality.



*Albanite the new transparentizing agent*

It is further claimed that the use of this new type transparentizing agent permits a fine-toothed, smooth drawing surface that takes strong pencil lines with a minimum wear on the point. On Albanene all lines are held by the fine hard tooth and do not become embedded in the paper structure, making Albanene extremely easy to erase or correct.

Albanene is offered in three weights — light, medium, and heavy. An illustrated brochure and a generous working sample of this new paper can be secured by writing to the manufacturer.

### Up-to-Date Color Assortment

Eight brilliant colors comprise the new drawing-ink assortment launched by Chas. M. Higgins and Co., Inc., Brooklyn, N. Y. They come packed in a decorative gift box with a button clasp on the front, each color in a standard ¾-oz. bottle.

(Continued on page 19A)

# THE MARKET PLACE

**SHOP SUPPLIES**
**TOOLS AND MACHINERY**
**Headquarters for School Woodworking Equipment**

Large and complete stock of woodworking machinery, tools and supplies. (Also good bargains in rebuilt machines.) *Knife grinding and saw filing a specialty*—quick service. Complete shop for expert machinery and tool repairs—satisfaction guaranteed. Write for catalog.

**WOODWORKERS' TOOL WORKS**
**224 S. Jefferson St. Chicago, Ill.**

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**LEATHERCRAFT**

LEATHERS, LACING, TOOLS, ZIPPERS, SNAPS, ALL WOOL FELT, BEADS, WOOD PLAQUES, AND NEW FLEXIBLE WOODEN SOLE SANDLE KITS.

*Schools send stamp for catalogue.*

LAPCHESKE LEATHER COMPANY
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We have a complete line of practical handicrafts supplies for immediate shipment including

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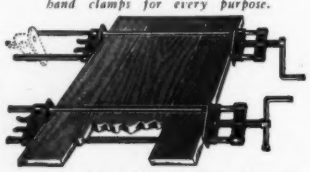
**HARTFORD CLAMPS**

Hartford Single and Double Bar, Self-Locking and Unlocking Clamps have been standard in most schools for over fifteen years.

*Write for free catalog covering hand clamps for every purpose.*



Note how the double bars keep the work from buckling.

**HARTFORD CLAMP CO.**
Burnside Connecticut

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**WoodWORKERS *Here it is!***

HERE is Harold Hunt's latest edition 1940 buyers guide and catalog. Nothing like it ever before published in the history of woodworking—136 pages of vital FACTS including new designs, new hints on finishing, many NEW IDEAS for **experts;** (AND a new supplementary service showing **beginners** how to make beautiful furniture the first week)— Also — Lists of ASTONISHING BARGAINS in all standard American woods, rare hard-to-find fancy imported woods, panels, veneers, ornaments, inlays, hand tools, power tools and hardware. **Experts and Amateurs: GET THIS BOOK NOW.** Send only 10c

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**By Ross C. Cramlet**

All the information and instruction needed by the beginner to make practical, beautiful articles out of leather. Emphasizes simple tool processes and the selection of proper materials. Many projects included. *Illustrated.* *$1.00*

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*W1 Archery Kit* 5 ft. Rock Elm Shaped Stave, String, 4 Birch Shafts, Feathers and Points $1.25 per set Post Paid.

*W1A Archery Kit* 5 ft. 6 in. Shaped Lemonwood Stave (will make up to 45 lb. pull), String, 4 Shafts, Feathers and Points $2.00 Post Paid.

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The Perfect Manual Training Project.

IES lamps built from our quality kits-reasonably priced.

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**For Sloyd and Manual Training work, there are no finer knives made than Robert Murphy's.**

**Over 85 years of experience, research and experimentation enable us to offer knives of guaranteed quality. Every blade is especially processed of the finest steel to stand the gaff of school shop use and STAY SHARP.**

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**ROBERT MURPHY'S SONS CO.**
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LEATHERS, TOOLS and FITTINGS
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AMERICAN GAS FURNACE CO. PIONEERS IN ITS FIELD LEADERS TODAY

Complete Tables
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Suitable sizes for school shops
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**ELECTRIC MOTOR PARTS**
FOR ALL MAKES

**ALSO ALL MATERIALS AND TOOLS USED IN THE MOTOR REPAIR SHOP**
**Free Catalogue to Instructors**

**READING ELECTRIC CO., Inc.**
200 William St. New York
227 W. Van Buren St. Chicago, Ill.

The APPROACH to Aviation

As a great new industry, aviation is calling for vocational education leading to it. Thousands of boys in school today are vitally interested in entering the various phases of aviation, and the building of model airplanes under proper supervision is the natural gateway to this training.

Megow model kits serve the teacher well, offering endless variety, accurate plans and progression . . . and in building them, one becomes thoroughly trained in the basic fundamentals of aerodynamics.

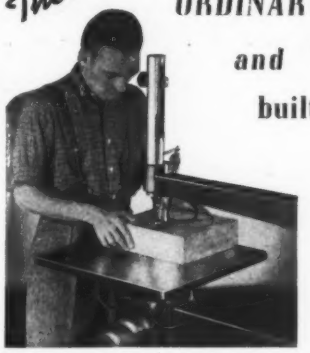
*Write for full information*

Megow's Howard and Oxford Sts., Philadelphia, Pa.

There's a Difference in Power Tools—

ORDINARY "HOMESHOP" KIND and BOICE-CRANE

built specially for industry and instruction



Strapping strong, *hard-to-wear-out construction* of each and every part of each and every machine Boice-Crane builds is one of the biggest differences you'll find. Parts are machined and final assemblies are tuned and adjusted to the close precision limits usually found only in expensive machine tools.

Big in Capacity but Priced for Small Budgets

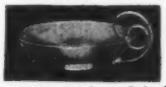
Larger capacity in practically every Boice-Crane tool is another major difference that makes Boice-Crane so much preferred by Industrial Arts men and factories.

You want compact, inexpensive tools but you want them for man-sized jobs. That's exactly how Boice-Crane builds them. Capacity is never sacrificed to cut the price a few dollars.

For instance the 24" Boice-Crane Scroll Saw shown is the only one made with 5" depth of cut capacity. *Actually 2½ times usual capacity.* Notice the exceptionally large 20" x 20" work table.

Similar *extra* value and *extra* capacity in Boice-Crane's—Saws, Jointers, Shapers, Planers, Sanders, Drill Presses and Band Saws.

METAL SPINNING TOOLS



We are headquarters for Spinning Tools and Accessories. Can be used on most makes of lathes. All tools shown in our general catalog. Spinning Instruction Book FREE to instructors.

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BOICE CRANE COMPANY

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Indicate which FREE books you want
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(Continued from page 17A)

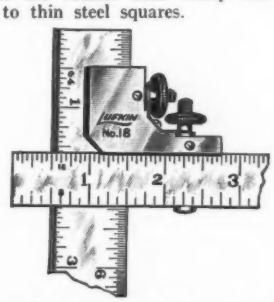
The box opens at top and front, affording the user the utmost convenience on the studio table or desk. The hues approximate those of the Ostwald System which, undoubtedly, is one of the most scientific and advanced color theories. The brilliance and miscibility of the colors contained in the Higgins drawing-ink set make it useful to teach or to carry out any color theory. The flap of the box contains reading matter

interesting to the user of the outfit and also shows the names of the colors and in what sequence they are to be replaced.

The colors contained in the assortment are red, yellow, blue, green, turquoise blue, red violet, brown, and black. The outfit is suitable for use by artists, architects, engineers, draftsmen, designers, cartoonists, illustrators, letterers, and colorists.

### Lufkin Right-Angle Rule Clamp

Another improved item just added to the line of precision tools made by The Lufkin Rule Co., Saginaw, Mich., is the right-angle rule clamp. It will firmly hold at right angles a combination square blade (12, 18 or 24 in.) and any regular steel rule not over 1 in. wide. So combined and employed w th the heads of a combination square, many valuable applications and uses are found. This clamp can also be applied to thin steel squares.



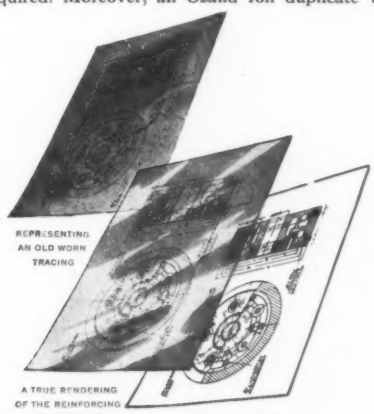

The clip with prongs at each end holds both clamp nuts in place. Interference of the two bolts and nuts is thus eliminated. Thumb nuts of this right-angle rule clamp No. 18A are knurled for good grip and are of size most convenient to operate.

### Ozalid Foil

Instructors in industrial arts will find Ozalid light-sensitive foil, just recently placed on the market by the Ozalid Corp., 354 Fourth Avenue, New York City, an interesting product owing to its numerous applications in the technical reproduction field.

The illustration shows how the foil is used in reviving the detail of an old, soiled, and faded tracing. These results are accomplished by first making a foil duplicate from which can be produced any number of Ozalid paper prints characterized by stronger lines and clearer background than inherent in the original drawing. In this application the foil acts as an intensifier due to the exceptional "covering power" of the opaque sepia line developed by the foil. By deleting undesirable, smudgy, and soiled background this foil also acts as a filter.

Other important applications of this clear foil include its use as a substitute for an original in instances where more than one original is required. Moreover, an Ozalid foil duplicate will


REPRESENTING AN OLD WORN TRACING
A TRUE RENDERING OF THE REINFORCING QUALITIES OF OZALID FOIL
A SUBSEQUENT OZALID PRINT MADE FROM THE FOIL

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(Continued on page 21A)

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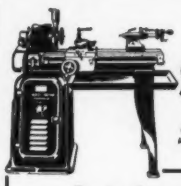

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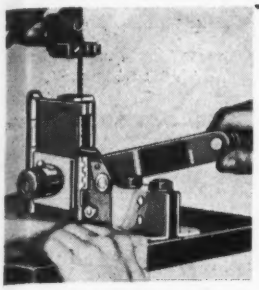

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(Continued from page 19A)

foil duplicate is made and that portion of the drawing to be dropped is deleted either by the use of Ozalid corrector fluid or by employing the block-out method. Additions and corrections can then be added. Ozalid whiteprints made from this altered foil duplicate will reflect these changes. Such results have been possible heretofore only by the use of complex, wet processes utilizing negatives and employing darkroom handling.

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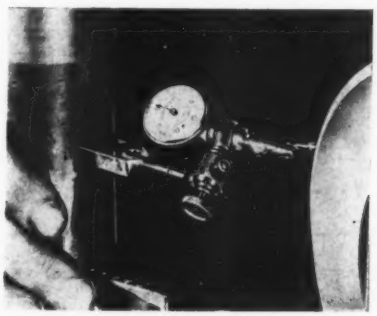
The illustration shows a typical application of a No. 711 last word indicator. This gauge has a range of .030 inch by thousandths, or it can be furnished in metric, 1/1000 mm. It has



reversible action, a ratchet-joint contact point, adjustable dial, and a swiveling tubular body. It is shown mounted in the tool post of a lathe by means of a universal shank.

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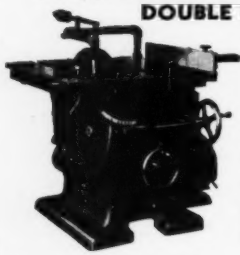

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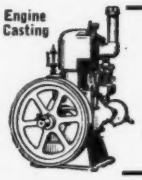


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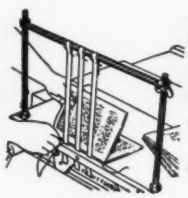

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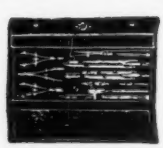

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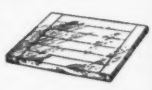

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